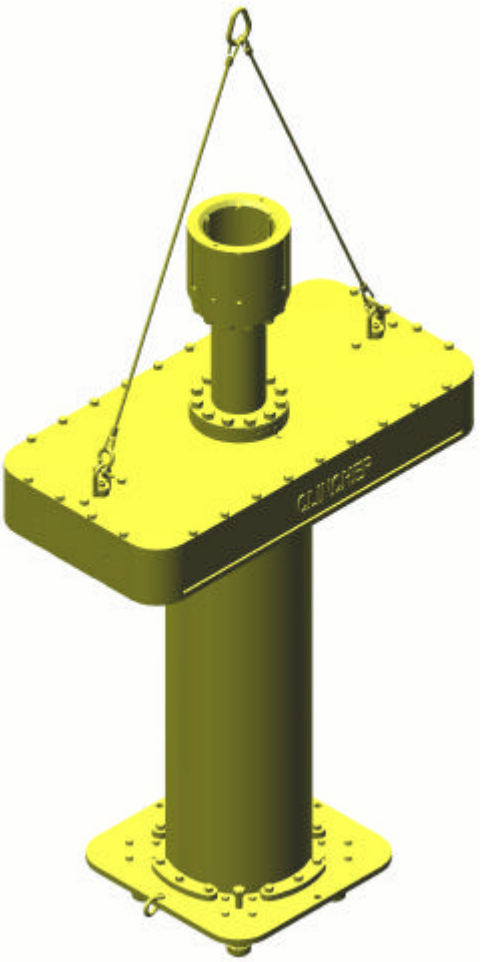
SUPERIOR
Manufacturing & Hydraulics

# *TECHNICAL MANUAL*

## TOP DRIVE MAKE BREAK TOOL



**covers**

**MODEL**

**TDMB2000**

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Broussard, Louisiana 70518
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www.superior-manf.com

Published 02/2005

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**This manual is not a controlled document and is subject to revision without notice. To receive updates and insure you have access to the latest information concerning the CLINCHER Make/ Break Tool, we request you complete this form and return the lower half to SUPERIOR Manufacturing and Hydraulics by mail or facsimile. Access to our manuals can also be acquired through our web site www.superior-manf.com. Click the tab 'CLINCHER Products', click the equipment from the list to get Specs page, click the tab 'Download Manual'.**

**Name:** _____
**Company:** _____
**Address:** _____
**Address:** _____
**City:** _____ **State:** _____
**Postal Code:** _____ **Country:** _____
**Telephone:** _____ **Fax:** _____

**Make/Break Model No.:** _____ **Serial No.:** _____
**Assembly Date:** _____

---

## CLINCHER Make/Break Tool Technical Manual Registration Form

**Name:** _____
**Company:** _____
**Address:** _____
**Address:** _____
**City:** _____
**Postal Code:** _____ **Country:** _____
**Telephone:** _____ **Fax:** _____

**Make/Break Model No.:** _____ **Serial No.:** _____
**Assembly Date:** _____

**Return To:**

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# CLINCHER MAKE/BREAK TOOL

## REVISION TABLE

| *Section* | *Page* | *Date* | *Description* |
|---|---|---|---|
| Cover | Cover | 02/2005 | Changed illustrations to show new lower extension assembly. |
| 2 | 1-2 | | |
| 8 | 1-3, 4.1, 6 | 02/2005 | Added illustration TDMB2040 Lower Extension Assembly. Revised illustration Make/Break Tool Assy. to show TDMB2040 Lower Extension Assy. Revised illustration TDMB1036 Air Booster Panel. |
| 2 | 7 | 04/18/05 | Revised Specs-Makeup Torque from 110,000 ft/lbs to 130,000 ft/lbs. |

# CLINCHER Make/Break Tool

# HAZARD WARNING

Nomenclature used in this manual:

**WARNING** concerns an operating procedure or practice that, if not strictly observed, can result in injury to personnel or loss of life.

**Caution** concerns an operating procedure or practice that, if not strictly observed, can result in damage to or destruction of equipment.

Note concerns an operating procedure or practice that needs highlighting.

CLINCHER Make/Break Tools are manufactured to provide a means of making up or breaking out high torque tubular connections between Varco TDS3, TDS4 & TDS5 Top Drives and their upper internal blowout preventer (IBOP) valves. This tool utilizes high pressure hydraulic fluid power which can cause the tool to move suddenly and with great force if it is not properly rigged up and operated. CLINCHER Make/Break Tools contain rotating and reciprocating parts which can severely or fatally injure personnel who are operating, repairing, or near this equipment during its operation. **WARNING: Make/Break Tools are not to be operated by untrained personnel or per-sonnel with diminished physical or mental capacity. No work of any type is to be carried out while the Make/Break Tool is connected to any hydraulic power unit.**

CLINCHER Make/Break Tools are heavy tools. When lifted vertically, they should be suspended from a secure, high strength 5/8" IWRC minimum diameter wire cable with a 20.6 ton minimum breaking strength. The wire cable should be hung as close to the center of the wellbore as possible, without interfering with drilling equipment operation, to allow the tool to be readily swung into the working position. **WARNING: Users must insure the entire lifting system including cables, rig mounting points, lift cylinders, lifting brackets/bridles, winches, pulleys, counter weights, etc., are capable of handling the static weight of the tool PLUS any shock loads which may be seen during operation.**

A 2" IWRC minimum diameter wire cable with a 198 ton minimum or better breaking strength, should be attached at a 90 degree angle to the Make/Break Tool and at the same level to insure proper readout of optional external torque indicator. If optional external torque indicator is used, the rotary table must be unlocked and free to rotate. A SNUBBING LINE should always be attached to provide additional safety in the event of a rotary table lock slippage. **WARNING: Users must provide a means of safely controlling the Make/Break Tool movements in all directions when it is in use. Failure to account for its size, weight, movement and the amount of torque developed could result in personnel injury or death.**

# CLINCHER Make/Break Tool

# HAZARD WARNING

CLINCHER Make/Break Tools utilize high pressure hydraulic fluids. Portions of the tool, control valves, hydraulic lines and cylinders may contain high pressure fluid even when the power unit is de-energized and the fluid supply hoses are disconnected. During normal operation the temperature of the hydraulic fluids as well as hoses, piping, valves, etc., can rise to a level which can cause burns. **WARNING: Personal protective gear including safety glasses, face shields, protective gloves and protective clothing must be worn to guard against the hazards of high pressure fluids. Tight fitting clothing is required to prevent entanglement in rotating components. These tools should be serviced by thoroughly trained and qualified hydraulic technicians using procedures to safely insure hydraulic pressure is bled from these circuits.**

No attempt should be made to operate the CLINCHER Make/Break Tool for any purpose other than which it is intended. This system is capable of generating very large torsional loads which if improperly applied or controlled, could result in damage to the tubular, to the tool or could possibly result in injury or death of personnel. Do not attempt to operate the unit without correct dies and the proper size tubular being in the tool.

# HYDRAULIC PRODUCT SAFETY

**WARNING: Valve lever (spool) may "stick" (not center) under certain conditions allowing the hydraulic equipment to continue to operate and could cause serious injury, death or equipment failure.**

**VALVE SAFETY: Read and follow instructions carefully. Failure to observe instructions and guidelines may cause serious injury, death or equipment failure. A sticking valve (spool bind) may be caused by one or more of the following factors:**

**DIRTY OIL:** Oil must be filtered to a minimum of 25 microns. Filters should be changed regularly - spin-on types after 50 hours of initial use and then after every two hundred fifty hours of use. Use of a condition indicator is recommended. Consult your tractor or implement owner's manual for filtration and changing recommendations for internal systems.

**OIL REQUIREMENTS:** Premium quality anti-wear type oil with a viscosity between 100 and 200 SSU at operating temperatures. Certain synthetic oils may cause spool seals to swell and the valve to stick. If in doubt, call CROSS Engineering.

**IMPROPER HOOK UP OR MOUNTING:** Always use the proper size fittings. Hook up "in" & "out" as noted on the valve body. Do not overtorque pipe fittings. Mounting surfaces should be flat and care should be used when tightening mounting bolts. Over-tightened bolts can cause spool bind and casting breakage. When hooking a valve in series, always use a power beyond sleeve. Consult your tractor or implement manual to make sure you have the proper quick disconnect line connected to the inlet of the remote valve.

**MISAPPLICATION:** Always use the proper valve for the job. CONVERTA, CD, CS or CA valves should never be used for metered heavy load lifting - loaders or similar applications. Use an open center valve for open center applications and a closed center valve for closed applications. If in doubt, check with your tractor dealer. Contact CROSS if the valve allows the hydraulic equipment to creep excessively.

**MAINTENANCE:** Make sure all bolts are tightened and torqued to the recommended specification. Bent or broken parts should not be used. Replace immediately. Always use exact replacements. Always protect valve spool from paint overspray.

Faulty quick disconnects can cause high back pressures and sticking spools. Check quick disconnects periodically to make sure they are functioning properly. If valve spool does not center or appears to stick, do not use!

**PUMPS & MOTORS SAFETY:**

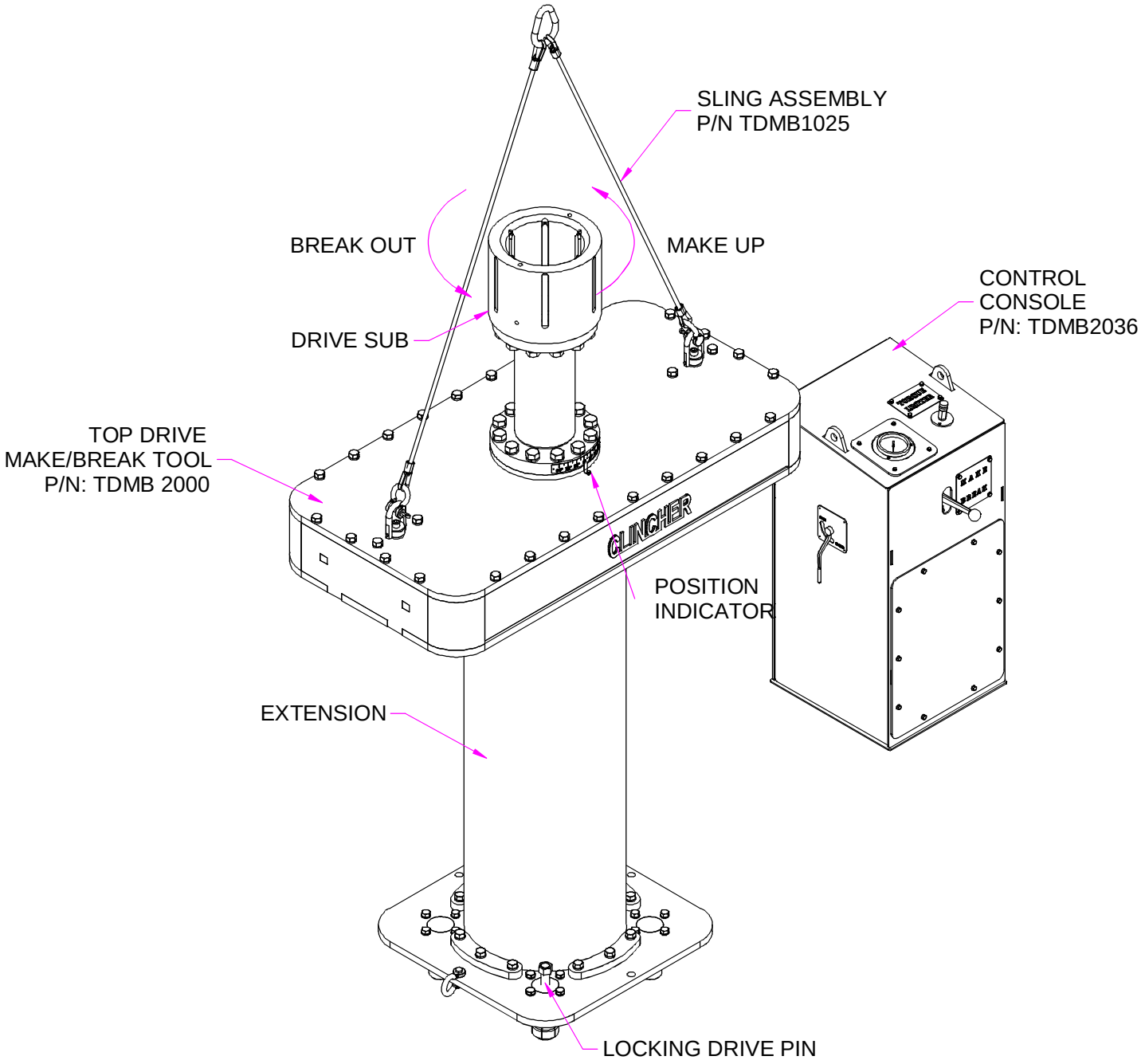
A relief or bypass in your hydraulic system is necessary to prevent pump from breakage due to overpressurization. Use correct fittings and proper oil as noted in the technical service manual packed with each unit. Change oil as recommended by your implement or tractor manufacturer.

**CYLINDER SAFETY:**

Check clevis clearances before, during and after extending the cylinder and before using the cylinder under pressure to avoid possible injury, or bent or broken rods caused by binding. Never operate a cylinder above recommended pressures. Never use a cylinder as a safety device when transporting equipment.

**PINHOLE LEAKS:**

If you observe a pinhole leak, discontinue use of the component. If oil has penetrated your skin or contacted your eye, seek medical attention immediately!

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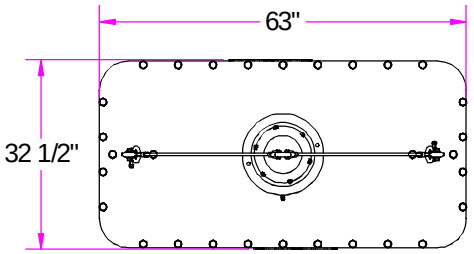


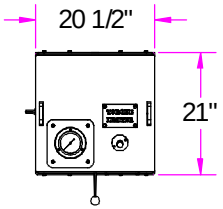


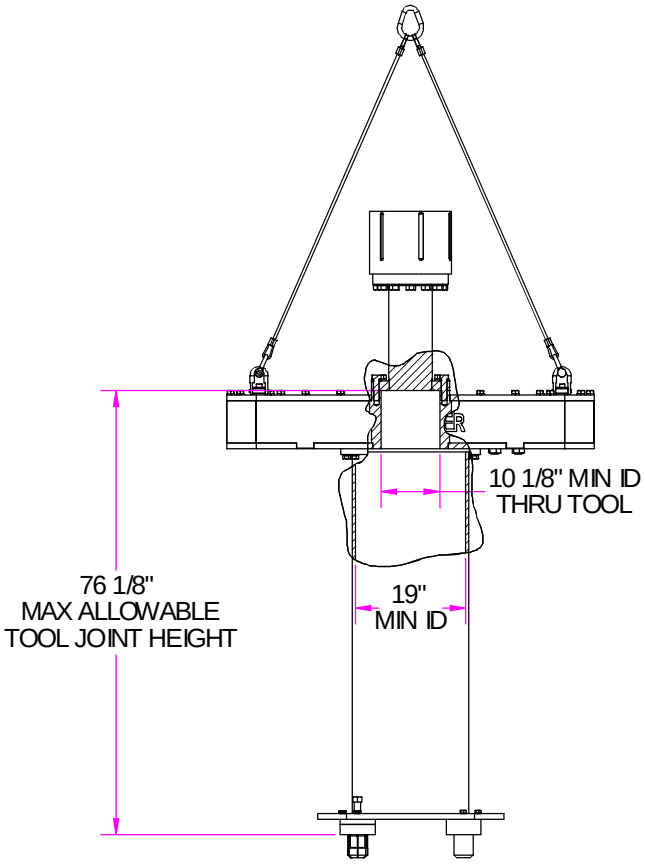


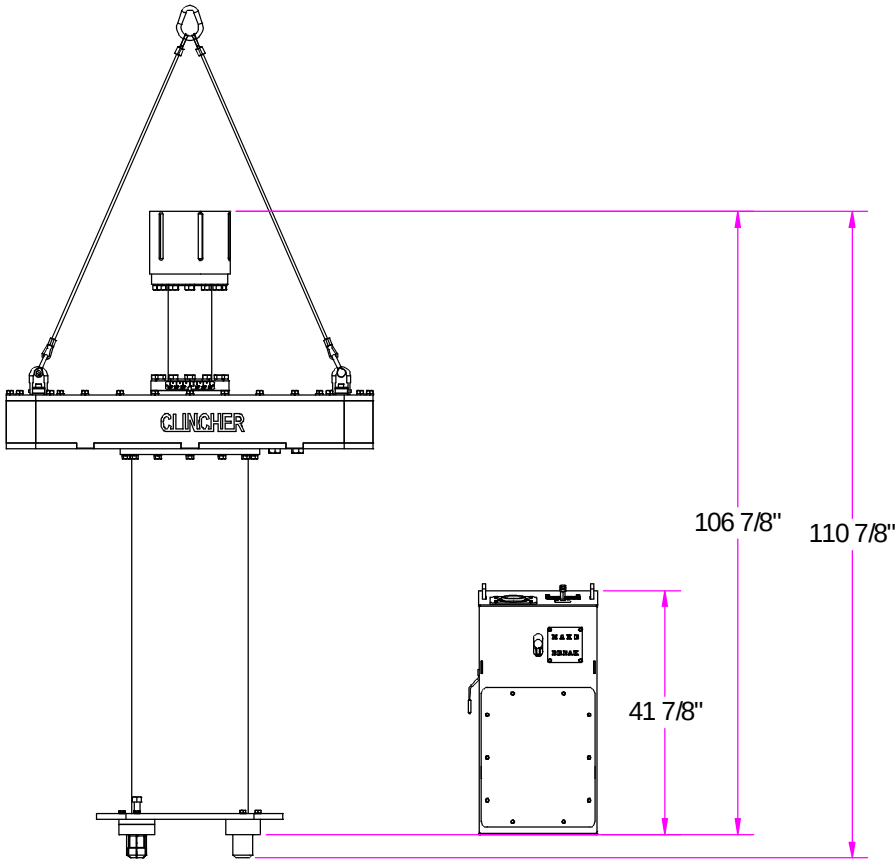


# DIMENSIONAL VIEWS

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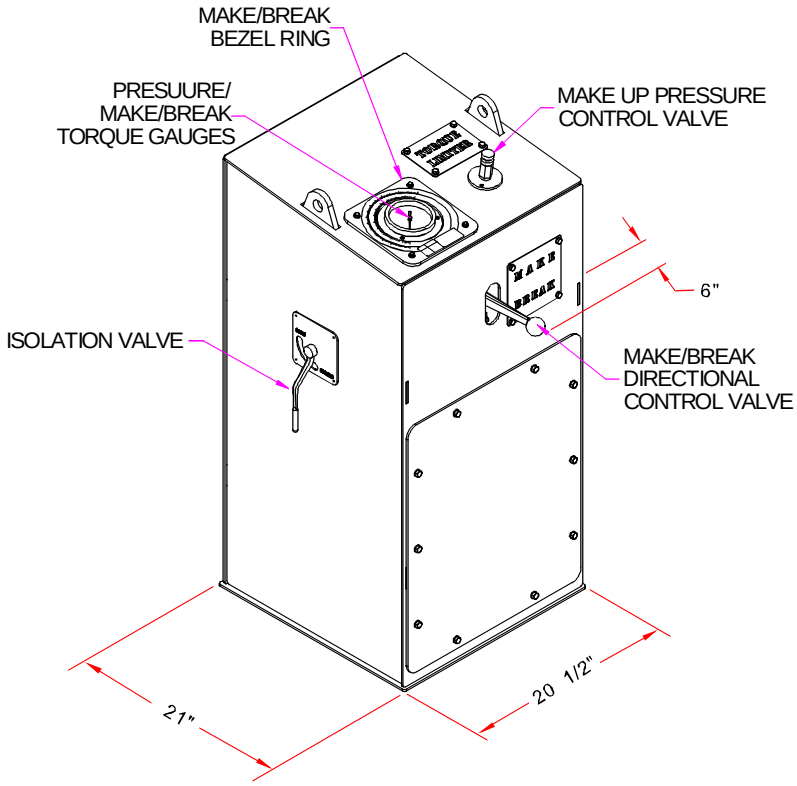


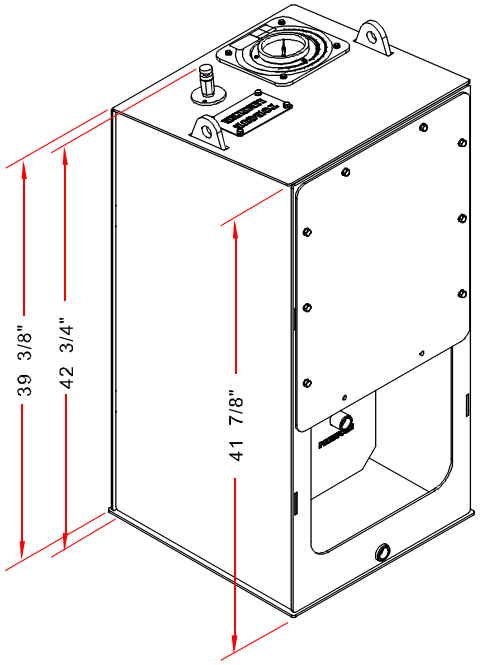




# MAKE/BREAK CONTROL CONSOLE DIMENSIONAL VIEWS

ASSEMBLY NO. TDMB2020

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| | | 12/16/04 |
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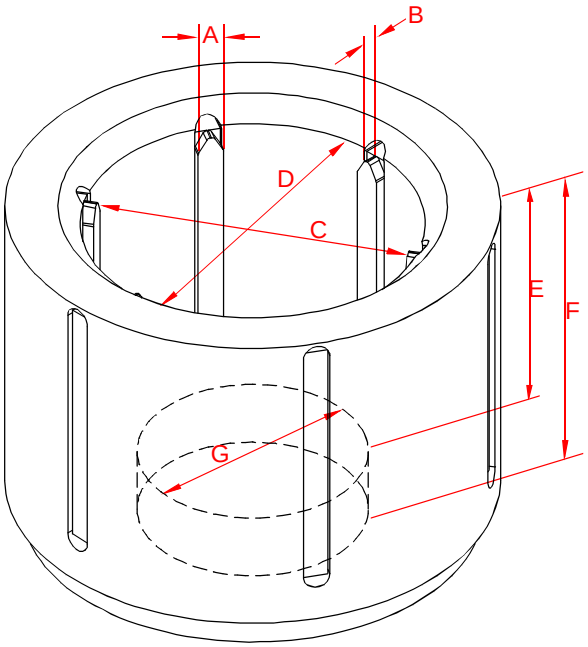
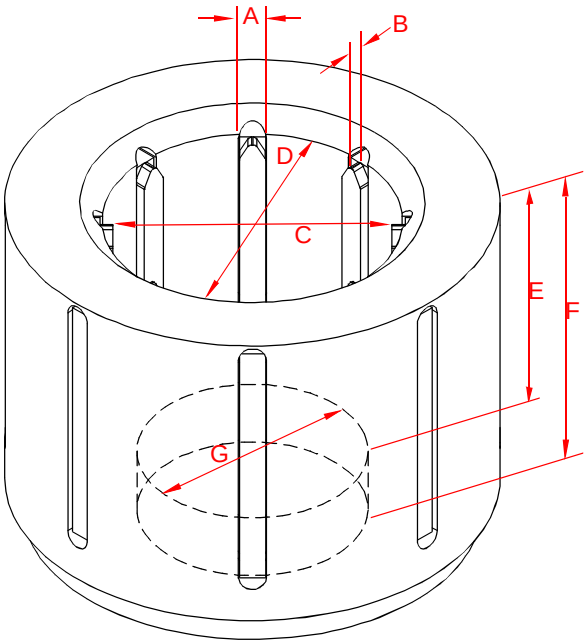
6 KEYS
A: 0.750
B: 0.313
C: 9.125
D: 9.750
E: 8.500
F: 10.500
G: 6.531




**PH85 DRIVE SUB**

8 KEYS
A: 0.750
B: 0.325
C: 7.875
D: 8.525
E: 8.500
F: 10.500
G: 6.531




**PH60 DRIVE SUB**

# SPLINED DRIVE SUB DIMENSIONS

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# DESCRIPTION and APPLICATION

The CLINCHER® RF (Rig Floor) Make/Break Tool is manufactured to service upper internal blow-out preventer valves associated with Varco TD3S, TD4S and TD5S top drives. This compact hydraulically operated tool generates a minimum of 110,000 ft/lbs of make-up torque and 130,000 ft/lbs of break-out torque when used with a 2000 psi hydraulic power supply (not included). Each cycle will generate 45 degrees of rotation.

The RF Make Break Tool's upper flanged hub allows a variety of accessories to be bolted in place to satisfy rig floor torquing needs. The bottom of the RF Make/Break Tool accepts pins which engage a 27 1/2" or 37 1/2" API Rotary Table Kelly Drive System per API 7K (other configurations upon request). The bottom is also flanged to accept a lower extension or accessories which are available to allow the bottom side to directly grip tubulars.

The RF Make/Break Tool is provided with an Upper Extension with flanged connections compatible for the tool and drive subs for Varco PH60 and PH85 Pipe Handlers' upper extension BOP valve. Approximate overall length is 20 1/4". The Extension OD of 7 1/4" is for compatibility with ring tongs. The drive sub maximum OD is 14", minimum ID is 6.65" and OAL is 10.5". Customer will need to specify if the RF Make/Break Tool is to be used with Varco PH60 or PH85 Pipe Handler.

The RF Make/Break Tool is provided with a Lower Extension with a flanged connection to raise the Make/Break Tool 54" above the Rotary Table. This extension offers a 19" ID to accommodate drillpipe tool joints suspended by rotary slips. Slip handles must be removed before landing Make/Break Tool and Extension.

The RF Make/Break Tool is provided with two torque drive subs and two lockdown drive subs. Lockdown drive subs feature CLINCHER® grit face coating to engage sockets without requirement for modifications. Drive subs may be attached directly to the bottom of the RF Make/Break Tool or to the bottom of the RF Make/Break Lower Extension.

The RF Make/Break Tool is also provided with a separate free standing hydraulic control console. The console is provided with quick disconnects for supply, return and work circuits. It includes a directional control valve for make/break connections and includes a gauge which allows monitoring of make/break torques and pressures. An adjustable pressure control valve allows the operator to regulate the amount of make-up torque developed. This control system is set up for closed style pressure compensated hydraulic power systems with pressures up to 3,000 psi. Control valves for open hydraulic systems are available upon request. System includes Haskel MAA gas booster, 3-way air valve, and air regulator to boost top drive braking force (installed by others).

A Handling Sling with welded padeyes features two 1/2" 6x19 IWRC galvanized cables 48" long with swaged open socket on lower ends for pinning to two padeyes welded to the upper extension tube. The upper end of the cables are looped through a 1" sling link and feature galvanized thimbles with swaged retaining sleeves. Sling is proof tested and equipped with a metal tag.

# DESCRIPTION and APPLICATION

Two 3/4" x 10' long two-wire hydraulic hoses with 2,500 psi working pressure are provided to connect control console to RF Make/Break Tool. These have a braided fabric protective cover to guard against abrasion. They are equipped with a 3/4" male NPT x 3/4" female JIC swivel hose ends.

Two 3/4" x 20' long standard two-wire hydraulic hoses with 2,500 psi working pressure are provided to connect control console to rig's hydraulic power loop. They are equipped with a 3/4" male NPT x 3/4" female JIC swivel hose ends.

An optional storage base incorporating the control console, pressure/torque gauge, torque control valve, and quick disconnects associated with hydraulic control console. This storage base is fabricated using 6"-17.25 PPF carbon steel S-beams and 1/2" flat plate. The plate contains openings for torque drive subs and lockdown drive subs. Hold downs are provided to lock RF Make/Break Tool to storage base during transit. Storage base features provisions for handling using forklift or four part sling (not included).

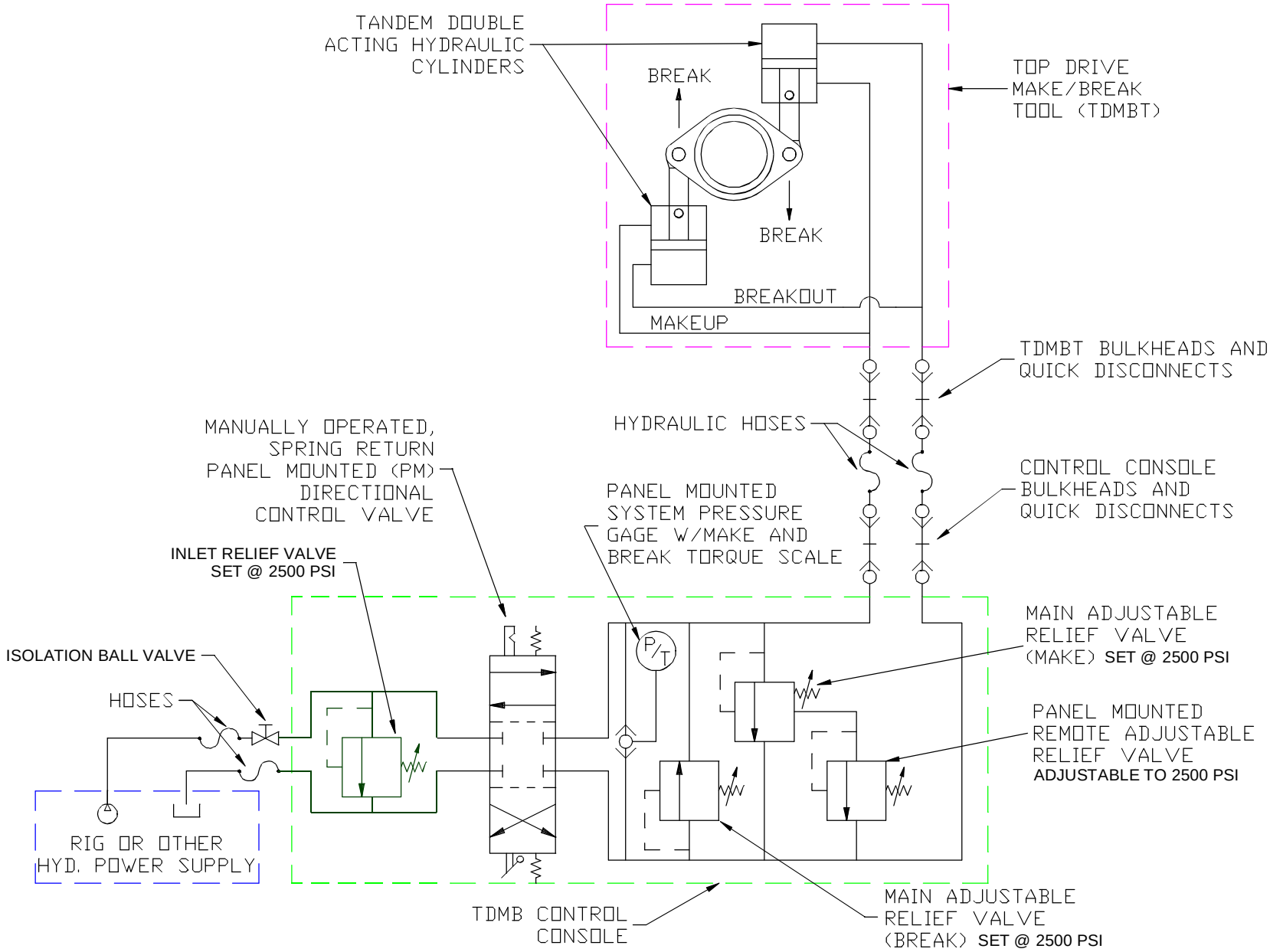
# SPECIFICATIONS

| | |
|---|---|
| **Makeup Torque [1]** | 130,000 ft.lbs. / 176,256.6 Nm |
| **Breakout Torque [1]** | 130,000 ft.lbs. / 176,256.6 Nm |
| **Maximum Operating Pressure** | 2,000 psi / 137.9 bar |
| **Minimum ID through Make/Break Tool** | 10 1/8" / 25.7 cm |
| **Upper Extension OD for compatibility with rig tongs** | 7 1/4" / 18.4 cm |
| **Upper Extension OAL (approximate)** | 20 1/4" / 51.4 cm |
| **Lower Extension ID to accommodate drill pipe tool joint suspended by rotary slips** | 19" / 48.26 cm |
| **Drive Sub Maximum OD** | 14.0" / 35.6 cm |
| **Drive Sub Minimum ID** | 6.65" / 16.9 cm |
| **Drive Sub OAL** | 10.5" / 26.7 cm |
| **Overall Length Make/Break Tool** | 30 5/16" / 77.0 cm |
| **Overall Width Make/Break Tool** | 68 1/2" / 174.0 cm |
| **Overall Height Make/Break Tool w/o Sling** | 106 7/8" / 271.5 cm |
| **Weight (approximate)** | 3,540 lbs. / 1,605.7 kg |

[1] Torque ratings are based upon 2,000 psi operating pressure.

**Standard Equipment:**

- Handling sling
- Control console
- Hoses to connect control console to Make/Break Tool
- Hoses to connect control console to hydraulic power loop


TANDEM DOUBLE ACTING HYDRAULIC CYLINDERS
BREAK
BREAK
BREAKOUT
MAKEUP
TOP DRIVE MAKE/BREAK TOOL (TDMBT)
TDMBT BULKHEADS AND QUICK DISCONNECTS
HYDRAULIC HOSES
CONTROL CONSOLE BULKHEADS AND QUICK DISCONNECTS
MANUALLY OPERATED, SPRING RETURN PANEL MOUNTED (PM) DIRECTIONAL CONTROL VALVE
PANEL MOUNTED SYSTEM PRESSURE GAGE W/MAKE AND BREAK TORQUE SCALE
INLET RELIEF VALVE SET @ 2500 PSI
ISOLATION BALL VALVE
HOSES
P/T
MAIN ADJUSTABLE RELIEF VALVE (MAKE) SET @ 2500 PSI
PANEL MOUNTED REMOTE ADJUSTABLE RELIEF VALVE ADJUSTABLE TO 2500 PSI
RIG OR OTHER HYD. POWER SUPPLY
TDMB CONTROL CONSOLE
MAIN ADJUSTABLE RELIEF VALVE (BREAK) SET @ 2500 PSI

# TOP DRIVE MAKE/BREAK TOOL

# HYDRAULIC SCHEMATIC

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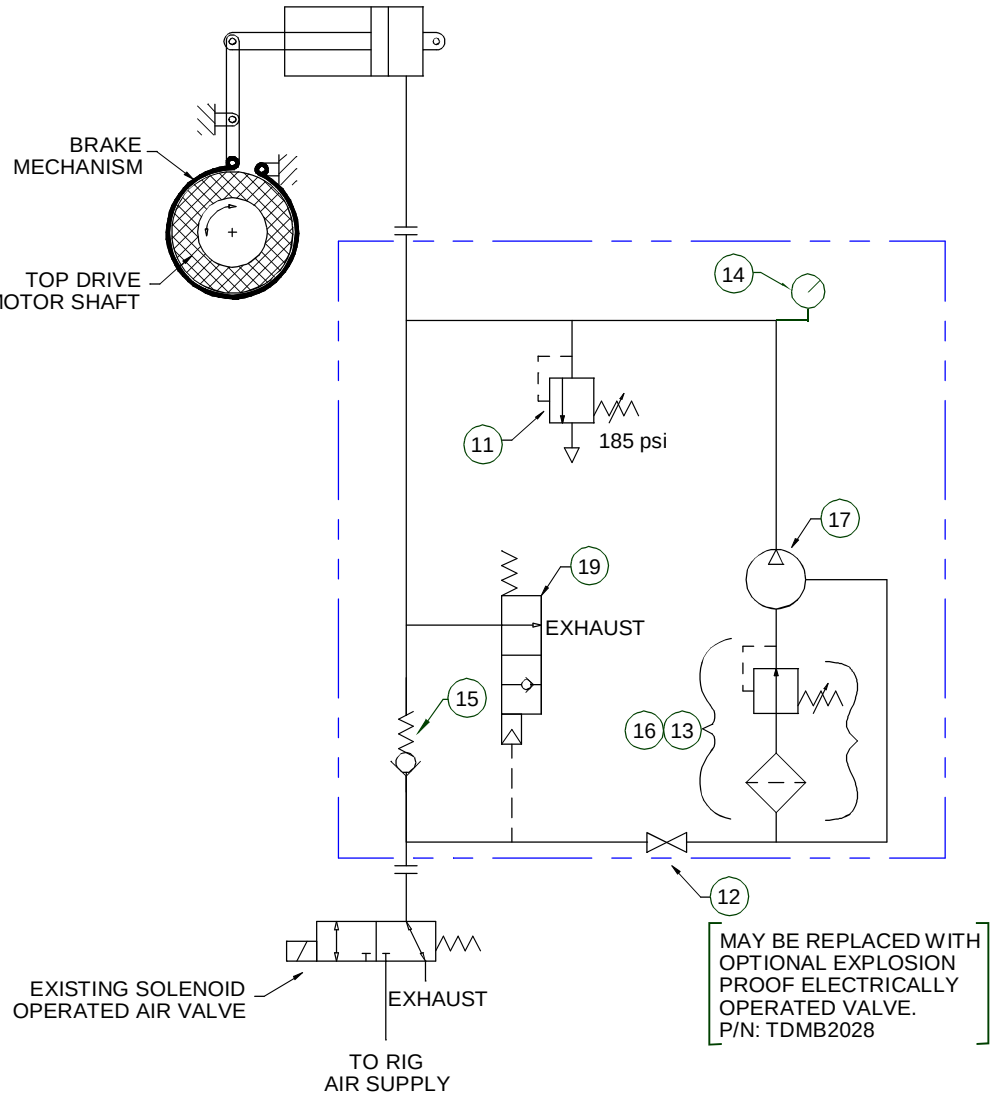


| Item | Qty. | Part No. | Description |
|---|---|---|---|
| 1 | 1 | 1/4 MRO | 1/4" MALE RUN TEE |
| 2 | 2 | 3/8 FF | 3/8" MALE PIPE NIPPLE |
| 3 | 2 | 3/8 MMS | MALE BRANCH TEE 3/8" MNPT X 3/8" FNPT |
| 4 | 2 | 3/8 MRO | 3/8" MALE RUN TEE |
| 5 | 1 | 3/8 X 1/4 FG | 3/8" NPT X 1/4" NPT EXPANDER/ADAPTER |
| 6 | 2 | 3/8 X 1/4 PTR | 3/8" NPT X 1/4" NPT PIPE THREAD REDUCER |
| 7 | 1 | 4 FTX | MALE CONNECTOR 1/4" MJIC X 1/8" MNPT |
| 8 | 1 | 4-4 FTX | 1/4" MNPT X 1/4" MJIC STRAIGHT |
| 9 | 2 | 6 FTX | 1/4" MNPT X 3/8" MJIC MALE CONNECTOR |
| 10 | 2 | 6-6 CTX | MALE ELBOW 3/8" MJIC X 3/8" MNPT |
| 11 | 1 | 9889K19 | AIR POP OFF VALVE 185 PSI, 1/4" NPT |
| 12 | 1 | 1478 | BALL VALVE BRASS, 3/8" FNPT |
| 13 | 1 | B18-02-FK00 | AIR FILTER/ REGULATOR 1/4" NPT PORTS |
| 14 | 1 | BAC-600-25 | GAUGE 600# 2 1/2" DIA BRASS |
| 15 | 1 | CM4554 | 3/8" CHECK VALVE |
| 16 | 1 | GPA-96-606 | AIR FILTER MOUNTING BRACKET FOR WILKERSON B18-02-FK00 |
| 17 | 1 | HAA31-2.5 | GAS BOOSTER, 2.5:1 RATIO |
| 18 | 1 | TDMB1036-S1 | AIR BOOSTER MOUNTING PLATE |
| 19 | 1 | TDMB1036-S2 | 2 POSITION / 4 WAY PILOTED AIR VALVE |



# TOP DRIVE BRAKE CYLINDER BOOSTER SCHEMATIC

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# ASSEMBLY

## FASTENER LUBRICATION AND MAKE UP TORQUE REQUIREMENTS

Most bolts, nuts, and other threaded components are to be lubricated with Never-Seez or equivalent before assembly. Certain fasteners are to be assembled using permanent or removable Loctite as indicated in the assembly instructions. All tapered pipe threads are to be treated with a Teflon based pipe dope to assist in makeup and prevent leakage.

**CAUTION:** Do not use teflon tape. Improper application of teflon tape can cause joint failures. Teflon tape can release large particles which can plug small passages in hydraulic equipment.

All standard fasteners used in CLINCHER® products are to be GRADE 8 or better. DO NOT SUBSTITUTE lessor grades of fasteners. All fasteners are to be made up to the torque charted below. Failure to properly assemble these fasteners can result in their loss, product malfunction, and ultimately result in situations where personnel can be exposed to dangerous situations.

| **FASTENERS** | |
|---|---|
| ***Size*** | ***Torque*** |
| 5/8 - 11 | 166 ft/lbs |
| 3/4 - 10 | 295 ft/lbs |
| 1 - 8 | 715 ft/lbs |
| 1 1/4 - 12 | 1,584 ft/lbs |

## LUBRICATION STANDARDS

Bearings and gears must be lubricated to minimize friction, cool, exclude foreign matter, and prevent corrosion. CLINCHER® recommends using Texaco Marfak MP 2 or equivalent for all grease zerts and bushings.

# CLINCHER UPPER IBOP MAKE/BREAK TOOL
# PRE-ORDER CONSIDERATIONS

Information needed from rig before ordering:

1. What is the master bushing manufacturer and model?
2. Is the rig equipped with a PH-60 or PH-85 Pipe Handler?
3. What is the Upper IBOP manufacturer and model?
4. What is the distance from the top drive guide rail stops to the top of the rotary table?

Additionally, rigs that want the remote-operated air valve will need to be notified of the following:

The remote solenoid option requires some modifications to the top drive control system and will increase the time required to make the brake booster operational. For this reason, Superior supplies the brake booster with the standard issue manual ball valve installed so that the booster kit can be installed relatively quickly on the initial use of the tool. The remote-operated air valve, and all associated electrical system and controls modifications, can be installed at a suitable time. This should avoid/minimize rig downtime.

In most cases to fully install the remote-operated air valve, the following will be required:

1. Add a two-position switch at the driller's console which will be used to select "high" or "low" brake pressure. (With most of our systems, these switches are simply connected to 24 volt input modules on the PLC and then there are either direct outputs from output modules on the PLC or output modules with isolated contacts that are used to switch the solenoid for a particular function). Assure that the solenoid valve used for remote operation is of the correct voltage, which will minimize modifications to the top drive control system at the time of installation.
2. Check for an available spare input at one of the PLC input modules.
3. Check for available spare output or isolated contact on one of the PLC output modules.
4. Check for one additional spare conductor from the transfer panel to the derrick junction box.
5. Check for an additional spare conductor in the service loop.
6. Check for an available entry on the top drive control junction box to install a cable gland and run cable to the new solenoid valve coil on the booster.
7. Make software changes to the PLC program to accept the new input and drive the new output accordingly.

# CLINCHER UPPER IBOP MAKE/BREAK TOOL PRE-ORDER CONSIDERATIONS

8. If indication on the driller's console is required, this will require the addition of an indicator light at the driller's console, along with the minor software change to drive the indicator light output.
9. Document drawing and software changes and burn a spare EPROM for the PLC that includes these programming changes.

# CLINCHER UPPER IBOP MAKE/BREAK TOOL OPERATIONAL INSTRUCTIONS

The purpose of this document is to familiarize the drill and maintenance crews with the safe operation of the Global Santa Fe/Superior Upper IBOP Make/Break Tool. If this procedure is followed correctly, it will allow removal and replacement of the upper IBOP on the Varco TDS3, TDS4 and TDS5 models.

**Basic Tool Design Features:**

- Personnel Safety – The tool has been designed with "Safety" in mind. It will allow removal and reinstallation of the upper IBOP without the use of rig tongs and other higher risk activities. It will allow reliable break out and accurate torque of the main shaft to the upper IBOP connection. Most of this work can be accomplished at rig floor level and without the requirement to remove any attachments or components from the top drive. Although generic JRA's (Job Risk Assessment) for removal and re-installation of the upper IBOP are included in this manual, **it is required to prepare and perform an accurate rig specific JRA before this operation is performed**. The attached JRA's will serve as guidelines for preparation of the rig specific JRA's.

- Efficiency – In addition to Safety, the tool has been designed to increase efficiency. Replacement of the upper IBOP can now be accomplished in a very short time and, in most cases, without having to remove any components from the top drive. With proper preparations and planning in place, which requires that the spare valve and tooling be maintained in a "ready" condition, this operation can be completed "safely" in approximately 1-2 hours rather than the original 6-12 hours that were normally experienced in many different fleet wide operations.

- Simplicity – The tool is extremely simple, with very few moving parts yet it is robust and capable of approximately 130,000 ft. lbs. of break out torque with a 2000 psi hydraulic supply. Once the brake booster plate has been installed on the top drive, it will remain permanently in place. There are no additional or complicated hook up requirements and the top drive can be prepared for tool use by simply switching a valve on the brake booster controls. The break out tool can be set in place and locked down to the rotary table in minutes.

- Storage – The tool can be designed with an optional storage base and can be moved around as a package. The control console may be attached to the storage base. **(Caution: The tool should be attached to the base with chain and binders to ensure safe handling if the unit is kept completely portable.** Some rigs may make a semi-permanent installation by removing the control console from the skid and permanently installing on the rig floor. With the controls installed and hoses stored on a local hose reel, it will only be required to lock the tool into the rotary table and hook up two hoses.

# CLINCHER UPPER IBOP MAKE/BREAK TOOL OPERATIONAL INSTRUCTIONS

- Back-Up – In the very unlikely event of a hydraulic failure, the tool is strong enough to allow us to apply a manual tong at a reasonable height above the floor so that the Upper IBOP can be removed or torqued manually. The diameter of the tong bite area on the tool is small enough that it will not be required to use the larger SDD tongs. The standard drill pipe tongs can be used.

**Preparations:**

- Brake Booster Installation – On receipt of the tool, it will be necessary to permanently mount the top drive brake booster kit and connect according to the air schematic. As there a number of differences in the various top drive configurations, it was not practical to design a mounting for each model and configuration. The air booster is supplied on a 15" square mounting plate that is drilled in each corner and will require some field fitting by the maintenance department. In addition, it will be necessary to make hoses to allow installation in the air circuit for the motor brake, per the air control schematic that is included with the tool documentation. As such, this one time installation will require the assistance of the rig welder and chief or mechanic for a short time. In most cases, the booster will be mounted on top of or near the motor brake on the top drive, being sure to use good sound methods that incorporate secondary retention on all fasteners to prevent falling object hazards.

- Hydraulic Installation – The Superior Make/Break Tool is provided with interconnecting hoses that run between the tool and control station. These are equipped with hydraulic quick disconnect couplings for easy tool set up. In addition, there is a set of 3/4" supply and return hoses supplied with the equipment. On receipt of the tool, it will be necessary to locate the nearest hydraulic supply and return lines and be sure that all quick disconnect fittings on the supply and return hoses are correct. Open the isolation valve on the side of the control console. The tool should be function tested and the make up regulator tested to be sure that the tool is set for the correct make up torque prior to use. This can be accomplished by cycling the tool in the make up mode while adjusting the panel mounted regulator. Break out requires no adjustment and will always provide maximum available torque. These preparations will prevent delays when the tool might be needed for an emergency valve change out. If absolutely necessary, the supply and return lines on the Varco pipe handler can be used as the supply to the control console. **(Caution: Always connect and open any valves in the return line before connecting the supply.)**

- Tool Storage – The tool should be anchored to the optional storage base when used, using binders, chains or straps and should be stored in a convenient location for quick and easy access, possibly even on the rig floor. **(Caution: The tool should be bound to the storage base before any lifting for transport.)** The control panel should be protected,

as well as the hose ends to prevent contamination. If the tool is stored outside, in an area that is convenient to the drill floor, a heavy tarp should be secured over the unit to maintain the unit is clean and ready condition. All hose ends should be cleaned, preserved with a grease coating and wrapped to prevent contamination.

- Spare Upper IBOP Storage - The spare upper IBOP should be equipped with the operating shell, a set of cranks and have a 7-5/8" lift cap installed. This will minimize any time lost when doing an emergency valve change out by preventing the requirement to stop and transfer these items from the removed valve. (It may be possible to add a permanent storage rack for the spare Upper IBOP on the tool base.)

**Operating Sequence – With drill pipe in the slips.**

Pull and review the JRA for this activity before proceeding. (A generic JRA has been prepared for your convenience and will serve as a basis for a job specific JRA that must be completed before proceeding.)

If the top drive is a TDS4, place the machine in Low gear before proceeding. Before starting this operation, drain the drill Kelly hose so that there will not be a column of mud to drain when the upper IBOP is removed.

1. Unlock and open the permanently installed selector valve on the top drive brake booster system. This will allow the brake booster to run when the brake is activated from the driller's console and the pressure will build up to 175 psi. It should be possible to hear the booster pump cycle and the pressure will be at or near 175 psi when the pump stops cycling. **(Caution: <u>If the booster pump does not stop then there is a leak in the brake, quick release valve or brake piping that must be corrected prior to continuing with this operation</u>.)**

2. Make up into the drill string or a single joint that is sitting in the slips and torque up as normal, close both the lower and upper IBOP valves.

3. With the UIBOP in the closed position, remove lift cylinder stop tubes on the PH60 or PH85 so that the pipe handler can raise and break out the connection between the upper and lower IBOP valves. Spin out with the top drive, leaving the saver sub and the lower IBOP valve on the drill pipe. Raise the top drive, latch the elevators on the drill string and set the pipe as low as possible in the slips. **(Caution: This total stick up height must not exceed 74 inches.)** Remove the slip handles so that the UIBOP tool can be set over the pipe with the slips in place.

# CLINCHER UPPER IBOP MAKE/BREAK TOOL OPERATIONAL INSTRUCTIONS

4. Unlatch the elevators and raise the top drive until the elevators have cleared the pipe stick up height.

5. Attach a 20 ft sling to the elevators and allow it to hang down for later use. This sling will be used for handling the Superior Make/Break Tool.

6. Attach a 10 ft or longer sling to the pipe handler frame and allow it to hang down for later use. This sling will be used later in the process to pull the pipe handler clear of the Make/Break Tool.

7. Attach the other end of the 20 ft. sling to the Make/Break Tool handling sling and connect an air tugger to the base for handling. Slowly raise the blocks until the Make/Break Tool is raised high enough to clear the drill pipe while tailing in with the tugger line. Slowly lower the Make/Break Tool over the drill pipe, saver sub and lower IBOP valve that are in the slips. If only air tuggers are used for handling, it is desirable to attach two tuggers to the Make/Break Tool on opposite sides of the top drive to minimize swinging and help center the tool over the rotary table. Proper use of tag lines attached to the bottom of the tool is recommended. This process is rig dependent and should be discussed thoroughly in the JRA.

8. Place the Superior IBOP Make/Break Tool over the pipe stick up, and lock into the rotary table by tightening the bolts on the expandable feet to approximately 80 to 100 ft.lbs. **(Caution: Do not tighten bolts to expand feet unless engaged in rotary tables sockets. Doing so will damage feet.)** Rotate the rotary table until the Make/Break Tool is perpendicular to the V door and the hydraulic connections are facing the control panel skid. Connect the make and break hoses to the Superior Make/Break Tool and connect the supply and return hydraulic hoses to a suitable location that will provide a 2000 psi supply. **(Caution: <u>Always be sure that the supply valves are closed and that the return line valve has been opened before connecting the supply hose</u>.)**

9. Open the isolation valve on the side of the control console and function test the tool.

10. Fully extend the link tilt toward the V door and lower the top drive until the pipe handler is just above the Make/Break Tool. Attach a tugger line to the sling on the back of the pipe handler and slowly pull clear of the upper IBOP. **(Caution: If the torque tube on the pipe handler will not clear the bottom of the upper IBOP, it may be necessary to loosen the four bolts on the lift cylinder rod attachment point in order to allow the pipe handler to drop slightly lower.)**

11. Lock the rotary table dogs to prevent the table from turning during torquing operations.

# CLINCHER UPPER IBOP MAKE/BREAK TOOL OPERATIONAL INSTRUCTIONS

12. Lower the Top Drive slowly while holding the pipe handler back to clear the Make/Break Tool until the splines on the upper IBOP engage the receiving collar on the top of the Make/Break Tool. Apply a slight set down force on the Make/Break Tool (1000-2000 lbs.) to ensure that the valve bottoms out in the receiving collar. **(Caution: Be sure that the top drive brake is off so that the shaft can rotate and align with the splines in the drive collar.)**

13. With the main hydraulic unit switched on and top drive brake off, cycle the Superior hydraulic cylinders by holding the handle to the make up position, allowing the top drive shaft to turn as the tool rotates.

14. Have the driller set the top drive brake and allow enough time for the brake booster to increase the brake pressure to 175 psi. (You can hear the booster cycle and then stop as the correct pressure is reached.)

15. Once the brake is locked, move the control lever on the Make/Break Tool to the break position and watch for breakout movement between the upper IBOP and main shaft. If necessary, release the top drive brake, recycle the tool and repeat the breakout sequence. (It may be helpful to put a mark across the main shaft to UIBOP connection so that it will be easier to see the movement as the connection loosens.)

16. Once the upper IBOP valve connection has been broken, switch the top drive brake off, lift the top drive very slightly to remove the 1000-2000 lbs. of set down weight and spin the main shaft out leaving the upper IBOP valve sitting in the receiving collar on the breakout tool.

17. Raise the top drive until the elevators will clear the upper IBOP when the link tilt is retracted, release the link tilt and raise further until the sling on the elevators is near the top of the IBOP. Using a step ladder, attach a lifting cap to the top of the IBOP and attach the sling and a tag line to lift cap. Using the blocks, slowly raise the IBOP out of the drive collar on the Make/Break Tool and lower to the drill floor. Dope the upper connection on the replacement valve and transfer the lift cap, lifting sling and at least two tag lines to the fully outfitted replacement IBOP. Use this rigging to raise the valve and dope the lower connection prior to placing the new valve into the drive collar. (The actuator collar and cranks should already be installed and adjusted on the new valve to save time.) <u>The valve needs to be in the closed position so that the pipe handler arms will realign later when the pipe handler is moved back into place</u>.

18. With the brake released and top drive in spin mode, slowly lower the top drive and spin into the replacement valve. Follow through with the top drive torque function and torque the valve to main shaft connection as high as possible with the top drive motor to minimize the required number of torque cycles with the Make/Break Tool.

# CLINCHER UPPER IBOP MAKE/BREAK TOOL OPERATIONAL INSTRUCTIONS

19. With the top drive brake switched off, cycle the torque cylinders to their full break position by holding the selector in the break position.

20. Have the driller set the top drive brake and allow the air pressure to reach 175 psi.

21. Reduce the torque regulator setting on the control console.

22. Place the Make / Break valve on the Superior console to the make position while watching the torque gauge. Slowly raise the torque adjustment until the desired torque setting is reached and hold for the required time interval (30 seconds).

23. Release the top drive brake and recycle the tool for another torque stroke. Set the brake and torque again to be sure that the torque cylinders have not reached the end of stroke on the previous sequence. Repeat these steps until connection is properly torqued.

24. Raise the top drive, remove the Superior IBOP Make/Break Tool from the rotary table and return it to the storage base using the same lifting methods utilized during installation.

25. Lower the top drive. Release the pipe handler when it is just above the lower IBOP, being careful to align the IBOP operating arms with the actuator shell.

26. Release the top drive brake and close the permanently installed selector valve on the top drive brake booster system.

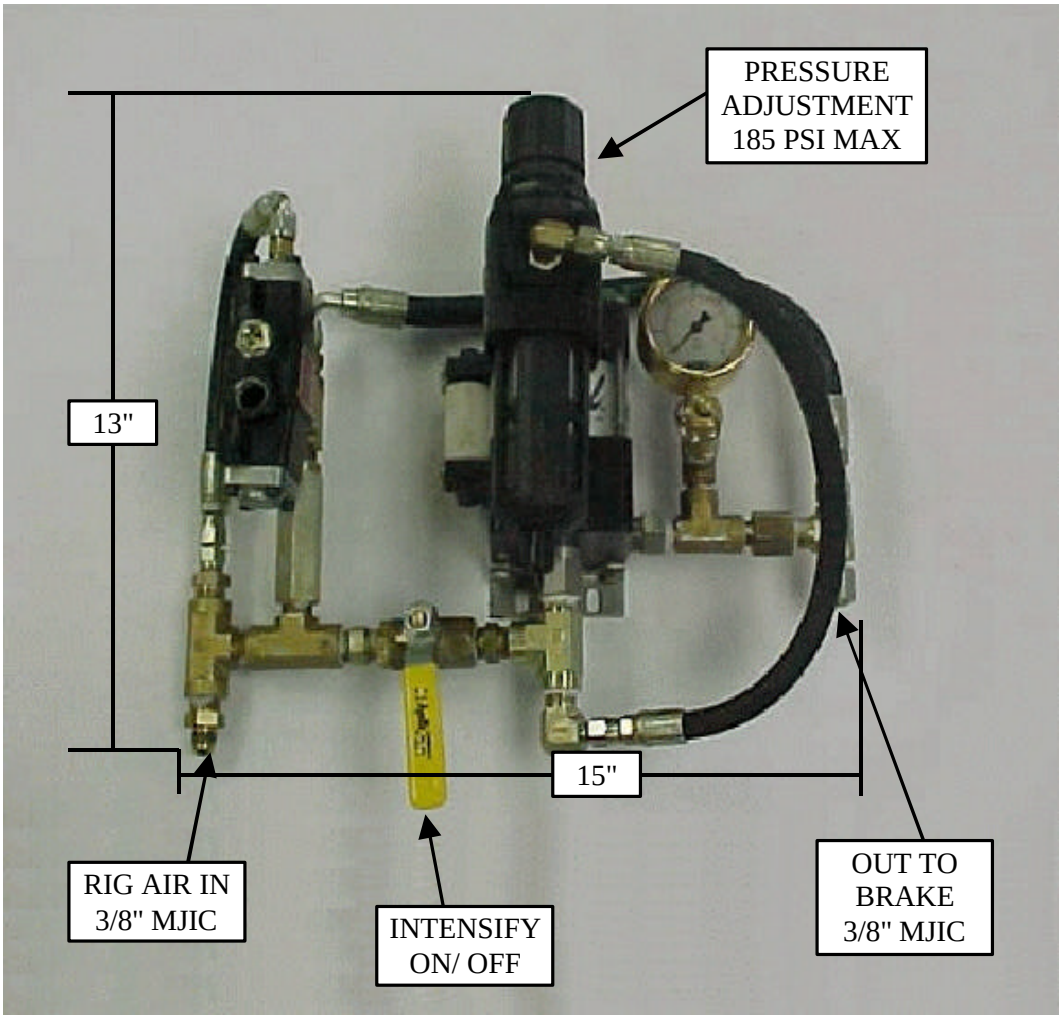
27. Place the top drive in spin mode and lower to stab into the lower IBOP while carefully guiding the pipe handler back over the lower IBOP valve. Use the top drive torque function to make this connection up as high as possible with the DC motor.

28. Set the make up torque on the pipe handler to the required torque for the upper to lower IBOP connection and use the pipe handler to complete the torque sequence on this connection.

29. Replace the stop tubes on the pipe handler lift cylinder to prepare for normal drilling mode.

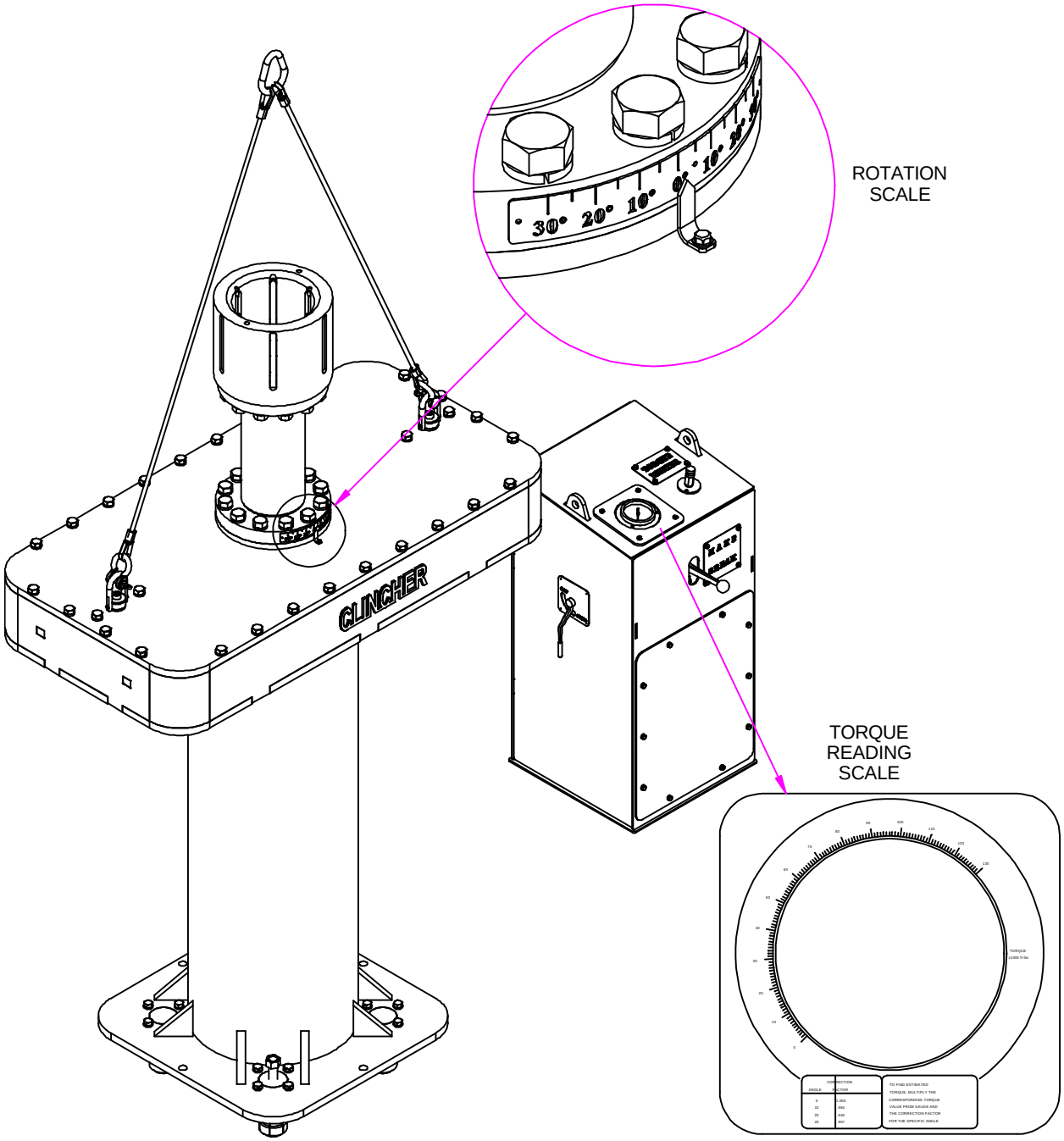
30. Reset the make up torque on the top drive console for the type of drill pipe connection that is being used and proceed with drilling operations.

# CLINCHER UPPER IBOP MAKE/BREAK TOOL OPERATIONAL INSTRUCTIONS



## INSTRUCTIONS FOR MEASURING TORQUE

To find the estimated torque, take the reading from the Torque Reading Scale (on the console). Multiply it by the Correction Factor of the Angle which corresponds to the reading on the Rotation Scale (on the Make/Break Tool). See illustration below.



| JRA Number | Job Risk Assessment (JRA) | Work Permit Type/No. | |
|---|---|---|---|
| | | Coshh/Hazcom No. | |
| | **Job Planning Outline** | Isolation Certificate # | |
| | | Entry Certificate # | |

## TASK EQUIPMENT

| No | Equipment Name/Type | Cerification Confirmed? | Who Inspects? |
|---|---|---|---|
| 1 | GSF/Superior "Clincher" Upper IBOP Breakout Tool | N/A | |
| 2 | GSF/Superior "Clincher" Upper IBOP Breakout Tool installed lift sling | | Rig Lift Inspection |
| 3 | Riding and safety belts | | |
| 4 | Step ladder | | |
| 5 | 7-5/8" RH lift cap for Upper IBOP handling | | |
| 6 | 10 ft or longer sling with minimum of 5 ton rating. | | |
| | | | |
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## TASK PARTICIPANTS

| No | Name | Position | Task Performed before? |
|---|---|---|---|
| 1 | | Toolpusher | |
| 2 | | Driller | |
| 3 | | Derrickman | |
| 4 | | Roughneck 2 | |
| 5 | | Roughneck 3 | |
| 6 | | Roughneck 4 | |
| 7 | | Crane Operator | |
| 8 | | Roustabout 1 | |
| 9 | | Roustabout 2 | |
| 10 | | Mechnanic | |

## TASK PROCEDURE

| Step | Task Detail | Who Performs? | Who Supervises? |
|---|---|---|---|
| 1 | Place the spare UIBOP valve in the receiving collar on UIBOP breakout tool | Roughnecks | Tool Pusher |
| 2 | Apply thread compound to the main shaft and Upper IBOP in preparation of make up. | Roughnecks | Tool Pusher |
| 3 | With link tilt fully extended and pipe handler held back, lower TD, stab in and torque. | Driller | Tool Pusher |
| 4 | With TD brake off cycle the Superior UIBOP tool fully to break position | AD or Derrickman | Tool Pusher |
| 5 | Set the TD brake and torque the UIBOP to required torque with Superior UIBOP tool. | AD or Derrickman | Tool Pusher |
| 6 | Raise the top drive and remove the Superior UIBOP break out tool from the rotary table. | Roughnecks | Tool Pusher |
| 7 | Apply thread compound to upper and lower IBOP valve connections. | Roughneck | Tool Pusher |
| 8 | Release the pipe handler carefully to be sure that IBOP arms correctly engage shell. | AD or Derrickman | Tool Pusher |
| 9 | Raise top drive and use elevators to set the pipe higher in the slips. | Driller - Roughnecks | Tool Pusher |
| 10 | With TD in spin, slowly lower, stab in and torque up the connection to the Lower IBOP. | Driller | Tool Pusher |
| 11 | Using pipe handler, torque the upper to lower IBOP torque connection to req. torque. | AD or Derrickman | Tool Pusher |

| JRA Number | Job Risk Assessment (JRA)<br>**Job Planning Outline** | Work Permit Type/No. | |
|---|---|---|---|
| | | Coshh/Hazcom No. | |
| | | Isolation Certificate # | |
| | | Entry Certificate # | |
| 12 | Reset the pipe handler torque to the required value for drill pipe being used, if needed. | AD or Derrickman | Tool Pusher |
| 13 | Replace stop tubes on pipe handler. | AD or Derrickman | Tool Pusher |
| 14 | Riding belt operations - close the TD brake booster valve and lock in place. | Roughneck | Tool Pusher |
| | | | |
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## Environmental Precautions

| Step | Task Detail | Who Performs? | Who Supervises? |
|---|---|---|---|
| 1 | Ensure that spill materials are readily available during operation of hydraulics. | Roughnecks | |
| 2 | Remove any oil that may drip while disconnecting hydraulic hoses | Roughnecks | |
| | | | |
| | | | |
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| | | | |

| HSE References | GlobalSantaFe<br>JOB RISK ASSESSMENT | Rig JRA Number | *Ho w to use the form:*<br>*1. Crew performing task review **ALL** generic **JRA** considerations.* |
|---|---|---|---|
| | | | *2. Review previous **JRA** update(s) for useful information, which will help **THIS** task.* |
| | | | *3. Create new **JRA** update with generic from and **ALL** considerations for this task.* |
| | | | *4. Carry out task per plan. If any conditions change, **STOP** and **RE-ASSESS!*** |
| | | | 5. Keep 2 copies of **JRA** update for future reference. Update generic **JRA** as needed. |

| L - LIKELIHOOD | | |
|---|---|---|
| CATEGORY | | DEFINITION |
| LOW | (1) | Remote |
| MED | (2) | Possible |
| HIGH | (3) | Probable |

| S - SEVERITY | | | | |
|---|---|---|---|---|
| CATEGORY | | DEFINITIONS | | |
| LOW | (1) | No Injury | No Damage | No Pollution |
| MED | (2) | First Aid Injury | Minor Damage | Minor Pollution |
| HIGH | (3) | Lost Time Injury | Major Damage | Major Pollution |

| SEVERITY | L | M | H |
|---|---|---|---|
| H | 3 | 6 | 9 |
| M | 2 | 4 | 6 |
| L | 1 | 2 | 3 |

R - RATING

LIKELIHOOD

| RESULT | |
|---|---|
| | Unacceptable |
| | Tolerable |
| | Acceptable |
| JRA Policy Reference | |
| HSE 100.20 | |

IS THERE A SAFER WAY TO COMPLETE THE JOB? ARE THERE ALTERNATIVES WITH LESS RISK?

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Location/Rig:** | **ALL Rigs with Varco DC top drives** | **Crew:** | | **Original Issue Date:** | | | |
| | | | | **Date Last Revised:** | **25-May-04** | | |
| **Activity:** | **Make up of the UIBOP valve using the GSF/Superior Tool with pipe in the slips.** | **Dept Head Approval:** | | **Last Revised By:** | **Robert Walsh** | | |

| Step | Task | Hazard | L | S | R | Risk Reduction Measure | Residual Risk L | Residual Risk S | Residual Risk R | Acceptable? Tolerable? Unacceptable? |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Place the spare UIBOP valve in the receiving collar on UIBOP breakout tool | | | | | | | | | |
| 2 | Apply thread compound to the main shaft and Upper IBOP in preparation of make up. | | | | | | | | | |
| 3 | With link tilt fully extended and pipe handler held back, lower TD, stab in and torque. | | | | | | | | | |
| 4 | With TD brake off cycle the Superior UIBOP tool fully to break position | | | | | | | | | |
| 5 | Set the TD brake and torque the UIBOP to required torque with Superior UIBOP tool. | | | | | | | | | |
| 6 | Raise the top drive and remove the Superior UIBOP break out tool from the rotary table. | | | | | | | | | |
| 7 | Apply thread compound to upper and lower IBOP valve connections. | | | | | | | | | |

| HSE References | GlobalSantaFe<br>JOB RISK ASSESSMENT | Rig JRA Number | *Ho w to use the form:*<br>*1. Crew performing task review **ALL** generic **JRA** considerations.* |
|---|---|---|---|
| | | | *2. Review previous **JRA** update(s) for useful information, which will help **THIS** task.* |
| | | | *3. Create new **JRA** update with generic from and **ALL** considerations for this task.* |
| | | | *4. Carry out task per plan. If any conditions change, **STOP** and **RE-ASSESS!*** |
| | | | 5. Keep 2 copies of **JRA** update for future reference. Update generic **JRA** as needed. |

| L - LIKELIHOOD | | |
|---|---|---|
| CATEGORY | | DEFINITION |
| LOW | (1) | Remote |
| MED | (2) | Possible |
| HIGH | (3) | Probable |

| S - SEVERITY | | | | |
|---|---|---|---|---|
| CATEGORY | | DEFINITIONS | | |
| LOW | (1) | No Injury | No Damage | No Pollution |
| MED | (2) | First Aid Injury | Minor Damage | Minor Pollution |
| HIGH | (3) | Lost Time Injury | Major Damage | Major Pollution |

| SEVERITY | R - RATING | | | |
|---|---|---|---|---|
| H | 3 | 6 | 9 | |
| M | 2 | 4 | 6 | |
| L | 1 | 2 | 3 | |
| | L | M | H | |
| | | LIKELIHOOD | | |

| RESULT | |
|---|---|
| | Unacceptable |
| | Tolerable |
| | Acceptable |
| JRA Policy Reference | |
| HSE 100.20 | |

IS THERE A SAFER WAY TO COMPLETE THE JOB? ARE THERE ALTERNATIVES WITH LESS RISK?

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | Release the pipe handler carefully to be sure that IBOP arms correctly engage shell. | | | | | | | | | | |
| 9 | Raise top drive and use elevators to set the pipe higher in the slips. | | | | | | | | | | |
| 10 | With TD in spin, slowly lower, stab in and torque up the connection to the Lower IBOP. | | | | | | | | | | |
| 11 | Using pipe handler, torque the upper to lower IBOP torque connection to req. torque. | | | | | | | | | | |
| 12 | Reset the pipe handler torque to the required value for drill pipe being used, if needed. | | | | | | | | | | |
| 13 | Replace stop tubes on pipe handler. | | | | | | | | | | |
| 14 | Riding belt operations - close the TD brake booster valve and lock in place. | | | | | | | | | | |
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| HSE References | GlobalSantaFe<br>JOB RISK ASSESSMENT | Rig JRA Number | *Ho w to use the form:*<br>*1. Crew performing task review **ALL** generic **JRA** considerations.* |
|---|---|---|---|
| | | | *2. Review previous **JRA** update(s) for useful information, which will help **THIS** task.* |
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| | | | *4. Carry out task per plan. If any conditions change, **STOP** and **RE-ASSESS!*** |
| | | | 5. Keep 2 copies of **JRA** update for future reference. Update generic **JRA** as needed. |

| L - LIKELIHOOD | |
|---|---|
| CATEGORY | DEFINITION |
| LOW (1) | Remote |
| MED (2) | Possible |
| HIGH (3) | Probable |

| S - SEVERITY | | | |
|---|---|---|---|
| CATEGORY | DEFINITIONS | | |
| LOW (1) | No Injury | No Damage | No Pollution |
| MED (2) | First Aid Injury | Minor Damage | Minor Pollution |
| HIGH (3) | Lost Time Injury | Major Damage | Major Pollution |

| SEVERITY | R - RATING | | | |
|---|---|---|---|---|
| H | 3 | 6 | 9 | |
| M | 2 | 4 | 6 | |
| L | 1 | 2 | 3 | |
| | L | M | H | |
| | | LIKELIHOOD | | |

| RESULT |
|---|
| Unacceptable |
| Tolerable |
| Acceptable |
| JRA Policy Reference |
| HSE 100.20 |

IS THERE A SAFER WAY TO COMPLETE THE JOB? ARE THERE ALTERNATIVES WITH LESS RISK?

| HSE References | GlobalSantaFe<br>JOB RISK ASSESSMENT | Rig JRA Number | *Ho w to use the form:*<br>*1. Crew performing task review **ALL** generic **JRA** considerations.* |
|---|---|---|---|
| | | | *2. Review previous **JRA** update(s) for useful information, which will help **THIS** task.* |
| | | | *3. Create new **JRA** update with generic from and **ALL** considerations for this task.* |
| | | | *4. Carry out task per plan. If any conditions change, **STOP** and **RE-ASSESS!*** |
| | | | 5. Keep 2 copies of **JRA** update for future reference. Update generic **JRA** as needed. |

| L - LIKELIHOOD | |
|---|---|
| CATEGORY | DEFINITION |
| LOW (1) | Remote |
| MED (2) | Possible |
| HIGH (3) | Probable |

| S - SEVERITY | | | |
|---|---|---|---|
| CATEGORY | DEFINITIONS | | |
| LOW (1) | No Injury | No Damage | No Pollution |
| MED (2) | First Aid Injury | Minor Damage | Minor Pollution |
| HIGH (3) | Lost Time Injury | Major Damage | Major Pollution |

| SEVERITY | R - RATING | | | |
|---|---|---|---|---|
| H | 3 | 6 | 9 | |
| M | 2 | 4 | 6 | |
| L | 1 | 2 | 3 | |
| | L | M | H | |
| | | LIKELIHOOD | | |

| RESULT | |
|---|---|
| | Unacceptable |
| | Tolerable |
| | Acceptable |
| JRA Policy Reference | |
| HSE 100.20 | |

IS THERE A SAFER WAT TO COMPLETE THE JOB? ARE THERE ALTERNATIVES WITH LESS RISK?

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
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| JRA Number | Job Risk Assessment (JRA)<br>**Job Planning Outline** | Work Permit Type/No. | |
|---|---|---|---|
| | | Coshh/Hazcom No. | |
| | | Isolation Certificate # | |
| | | Entry Certificate # | |

## TASK EQUIPMENT

| No | Equipment Name/Type | Cerification Confirmed? | Who Inspects? |
|---|---|---|---|
| 1 | GSF/Superior "Clincher" Upper IBOP Breakout Tool | N/A | |
| 2 | GSF/Superior "Clincher" Upper IBOP Breakout Tool installed lift sling | | Rig Lift Inspection |
| 3 | Riding and safety belts | | |
| 4 | Step ladder | | |
| 5 | 7-5/8" RH lift cap for Upper IBOP handling | | |
| 6 | 10 ft or longer sling with minimum of 5 ton rating. | | |
| 7 | 20 ft sling with a minimum of 5 ton rating | | |
| | | | |
| | | | |
| | | | |
| | | | |

## TASK PARTICIPANTS

| No | Name | Position | Task Performed before? |
|---|---|---|---|
| 1 | | Toolpusher | |
| 2 | | Driller | |
| 3 | | Derrickman | |
| 4 | | Roughneck 2 | |
| 5 | | Roughneck 3 | |
| 6 | | Roughneck 4 | |
| 7 | | Crane Operator | |
| 8 | | Roustabout 1 | |
| 9 | | Roustabout 2 | |
| 10 | | Mechnanic | |

## TASK PROCEDURE

| Step | Task Detail | Who Performs? | Who Supervises? |
|---|---|---|---|
| 1 | Locate and move IBOP Breakout tool to rig floor | Crane Operator | Tool Pusher |
| 2 | Locate and move Spare Upper IBOP to rig floor | Crane Operator | Tool Pusher |
| 3 | Connect the hydraulic supply and return hoses to the rig supply lines | Mechanic | Tool Pusher |
| 4 | Function test the tool to verify correct torque direction is correct. | Mechanic | Tool Pusher |
| 5 | Function test the make up pressure regulator and then set well below required torque. | Mechanic | Tool Pusher |
| 6 | Place the top drive in low gear, if possible. (Only TDS4 models) | Driller | Tool Pusher |
| 7 | Riding belt operations - to open the top drive brake booster valve. | Roughneck | Tool Pusher |
| 8 | Orient the TD so that link tilt is toward the V door | Driller | Toolpusher |
| 9 | Make up and torque the top drive to the drill string and set slips. | Driller | Tool Pusher |
| 10 | Close both the upper and lower IBOP valves | Roughneck | Tool Pusher |
| 11 | Remove stop tubes from pipe handler and store | Driller | Tool Pusher |

| JRA Number | Job Risk Assessment (JRA)<br>**Job Planning Outline** | Work Permit Type/No. | |
|---|---|---|---|
| | | Coshh/Hazcom No. | |
| | | Isolation Certificate # | |
| | | Entry Certificate # | |
| 12 | Using the pipe handler, break out and spin out of lower IBOP | Roughneck | Tool Pusher |
| 13 | Attach a 10 ft sling to back of pipe handler and allow to hang down for later use | Driller | Tool Pusher |
| 14 | Using elevators, pick up the string and set low in slips. (Total stick up less than 74".) | Driller - Roughnecks | Tool Pusher |
| 15 | Raise top drive, place the breakout tool in the rotary and lock down. | AD or Derrickman | Tool Pusher |
| 16 | Connect the hydraulic make/break hoses to the tool and cycle fully to make position. | Driller | Tool Pusher |
| 17 | Lower top drive while holding pipe handler back to stab UIBOP into receiving collar. | Driller - Derrickman | Tool Pusher |
| 18 | Lock the TD brake and use the breakout tool to loosen the UIBOP to main shaft conn. | Driller | Tool Pusher |
| 19 | Spin out connection and slowly raise the top drive to allow access to the UIBOP | Roughnecks | Tool Pusher |
| 20 | Install lift cap, 20 ft sling and multiple tag lines to the UIBOP and remove from fixture. | Roughnecks | ToolPusher |
| **Environmental Precautions** | | | |
| **Step** | **Task Detail** | **Who Performs?** | **Who Supervises?** |
| 1 | Ensure that spill materials are readily available during operation of hydraulics. | Roughnecks | |
| 2 | Remove any oil that may drip while disconnecting hydraulic hoses | Roughnecks | |
| | | | |
| | | | |
| | | | |
| | | | |

| HSE References | GlobalSantaFe<br>JOB RISK ASSESSMENT | Rig JRA Number | *Ho w to use the form:*<br>*1. Crew performing task review **ALL** generic **JRA** considerations.* |
|---|---|---|---|
| | | | *2. Review previous **JRA** update(s) for useful information, which will help **THIS** task.* |
| | | | *3. Create new **JRA** update with generic from and **ALL** considerations for this task.* |
| | | | *4. Carry out task per plan. If any conditions change, **STOP** and **RE-ASSESS!*** |
| | | | 5. Keep 2 copies of **JRA** update for future reference. Update generic **JRA** as needed. |

| L - LIKELIHOOD | | |
|---|---|---|
| CATEGORY | | DEFINITION |
| LOW | (1) | Remote |
| MED | (2) | Possible |
| HIGH | (3) | Probable |

| S - SEVERITY | | | | |
|---|---|---|---|---|
| CATEGORY | | DEFINITIONS | | |
| LOW | (1) | No Injury | No Damage | No Pollution |
| MED | (2) | First Aid Injury | Minor Damage | Minor Pollution |
| HIGH | (3) | Lost Time Injury | Major Damage | Major Pollution |

| SEVERITY | L | M | H |
|---|---|---|---|
| H | 3 | 6 | 9 |
| M | 2 | 4 | 6 |
| L | 1 | 2 | 3 |

R - RATING

| RESULT | |
|---|---|
| | Unacceptable |
| | Tolerable |
| | Acceptable |
| JRA Policy Reference | HSE 100.20 |

IS THERE A SAFER WAY TO COMPLETE THE JOB? ARE THERE ALTERNATIVES WITH LESS RISK?

LIKELIHOOD

| | | | | |
|---|---|---|---|---|
| **Location/Rig:** | **ALL Rigs with Varco DC top drives** | **Crew:** | | **Original Issue Date:** | |
| | | | | **Date Last Revised:** | **25-May-04** |
| **Activity:** | **Break out of the UIBOP valve using the GSF/Superior Tool with pipe in the slips.** | **Dept Head Approval:** | | **Last Revised By:** | **Robert Walsh** |

| Step | Task | Hazard | L | S | R | Risk Reduction Measure | Residual Risk L | Residual Risk S | Residual Risk R | Acceptable? Tolerable? Unacceptable? |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Locate and move IBOP Breakout tool to rig floor | | | | | | | | | |
| 2 | Locate and move Spare Upper IBOP to rig floor | | | | | | | | | |
| 3 | Connect the hydraulic supply and return hoses to the rig supply lines | | | | | | | | | |
| 4 | Function test the tool to verify correct torque direction is correct. | | | | | | | | | |
| 5 | Function test the make up pressure regulator and then set well below required torque. | | | | | | | | | |
| 6 | Place the top drive in low gear, if possible. (Only TDS4 models) | | | | | | | | | |
| 7 | Riding belt operations - to open the top drive brake booster valve. | | | | | | | | | |
| 8 | Orient the TD so that link tilt is toward the V door | | | | | | | | | |

| HSE References | GlobalSantaFe<br>JOB RISK ASSESSMENT | Rig JRA Number | *Ho w to use the form:*<br>*1. Crew performing task review **ALL** generic **JRA** considerations.* |
|---|---|---|---|
| | | | *2. Review previous **JRA** update(s) for useful information, which will help **THIS** task.* |
| | | | *3. Create new **JRA** update with generic from and **ALL** considerations for this task.* |
| | | | *4. Carry out task per plan. If any conditions change, **STOP** and **RE-ASSESS!*** |
| | | | 5. Keep 2 copies of **JRA** update for future reference. Update generic **JRA** as needed. |

| L - LIKELIHOOD | | |
|---|---|---|
| CATEGORY | | DEFINITION |
| LOW | (1) | Remote |
| MED | (2) | Possible |
| HIGH | (3) | Probable |

| S - SEVERITY | | | | |
|---|---|---|---|---|
| CATEGORY | | DEFINITIONS | | |
| LOW | (1) | No Injury | No Damage | No Pollution |
| MED | (2) | First Aid Injury | Minor Damage | Minor Pollution |
| HIGH | (3) | Lost Time Injury | Major Damage | Major Pollution |

| SEVERITY | L | M | H |
|---|---|---|---|
| H | 3 | 6 | 9 |
| M | 2 | 4 | 6 |
| L | 1 | 2 | 3 |

R - RATING

| RESULT |
|---|
| Unacceptable |
| Tolerable |
| Acceptable |
| JRA Policy Reference |
| HSE 100.20 |

IS THERE A SAFER WAY TO COMPLETE THE JOB? ARE THERE ALTERNATIVES WITH LESS RISK?

LIKELIHOOD

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 | Make up and torque the top drive to the drill string and set slips. | | | | | | | | | | |
| 10 | Close both the upper and lower IBOP valves | | | | | | | | | | |
| 11 | Remove stop tubes from pipe handler and store | | | | | | | | | | |
| 12 | Using the pipe handler, break out and spin out of lower IBOP | | | | | | | | | | |
| 13 | Attach a 10 ft sling to back of pipe handler and allow to hang down for later use | | | | | | | | | | |
| 14 | Using elevators, pick up the string and set low in slips. (Total stick up less than 74".) | | | | | | | | | | |
| 15 | Raise top drive, place the breakout tool in the rotary and lock down. | | | | | | | | | | |
| 16 | Connect the hydraulic make/break hoses to the tool and cycle fully to make position. | | | | | | | | | | |
| 17 | Lower top drive while holding pipe handler back to stab UIBOP into receiving collar. | | | | | | | | | | |
| 18 | Lock the TD brake and use the breakout tool to loosen the UIBOP to main shaft conn. | | | | | | | | | | |
| 19 | Spin out connection and slowly raise the top drive to allow access to the UIBOP | | | | | | | | | | |
| 20 | Install lift cap, tugger line and multiple tag lines to the UIBOP and remove from fixture. | | | | | | | | | | |

| HSE References | GlobalSantaFe<br>JOB RISK ASSESSMENT | Rig JRA Number | *Ho w to use the form:*<br>*1. Crew performing task review **ALL** generic **JRA** considerations.* |
|---|---|---|---|
| | | | *2. Review previous **JRA** update(s) for useful information, which will help **THIS** task.* |
| | | | *3. Create new **JRA** update with generic from and **ALL** considerations for this task.* |
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| | | | 5. Keep 2 copies of **JRA** update for future reference. Update generic **JRA** as needed. |

| L - LIKELIHOOD | | |
|---|---|---|
| CATEGORY | | DEFINITION |
| LOW | (1) | Remote |
| MED | (2) | Possible |
| HIGH | (3) | Probable |

| S - SEVERITY | | | | |
|---|---|---|---|---|
| CATEGORY | | DEFINITIONS | | |
| LOW | (1) | No Injury | No Damage | No Pollution |
| MED | (2) | First Aid Injury | Minor Damage | Minor Pollution |
| HIGH | (3) | Lost Time Injury | Major Damage | Major Pollution |

| SEVERITY | R - RATING | | | |
|---|---|---|---|---|
| H | 3 | 6 | 9 | |
| M | 2 | 4 | 6 | |
| L | 1 | 2 | 3 | |
| | L | M | H | |
| | | LIKELIHOOD | | |

| RESULT | |
|---|---|
| | Unacceptable |
| | Tolerable |
| | Acceptable |
| JRA Policy Reference | |
| HSE 100.20 | |

IS THERE A SAFER WAY TO COMPLETE THE JOB? ARE THERE ALTERNATIVES WITH LESS RISK?

| HSE References | GlobalSantaFe<br>JOB RISK ASSESSMENT | Rig JRA Number | *Ho w to use the form:*<br>*1. Crew performing task review **ALL** generic **JRA** considerations.* |
|---|---|---|---|
| | | | *2. Review previous **JRA** update(s) for useful information, which will help **THIS** task.* |
| | | | *3. Create new **JRA** update with generic from and **ALL** considerations for this task.* |
| | | | *4. Carry out task per plan. If any conditions change, **STOP** and **RE-ASSESS!*** |
| | | | 5. Keep 2 copies of **JRA** update for future reference. Update generic **JRA** as needed. |

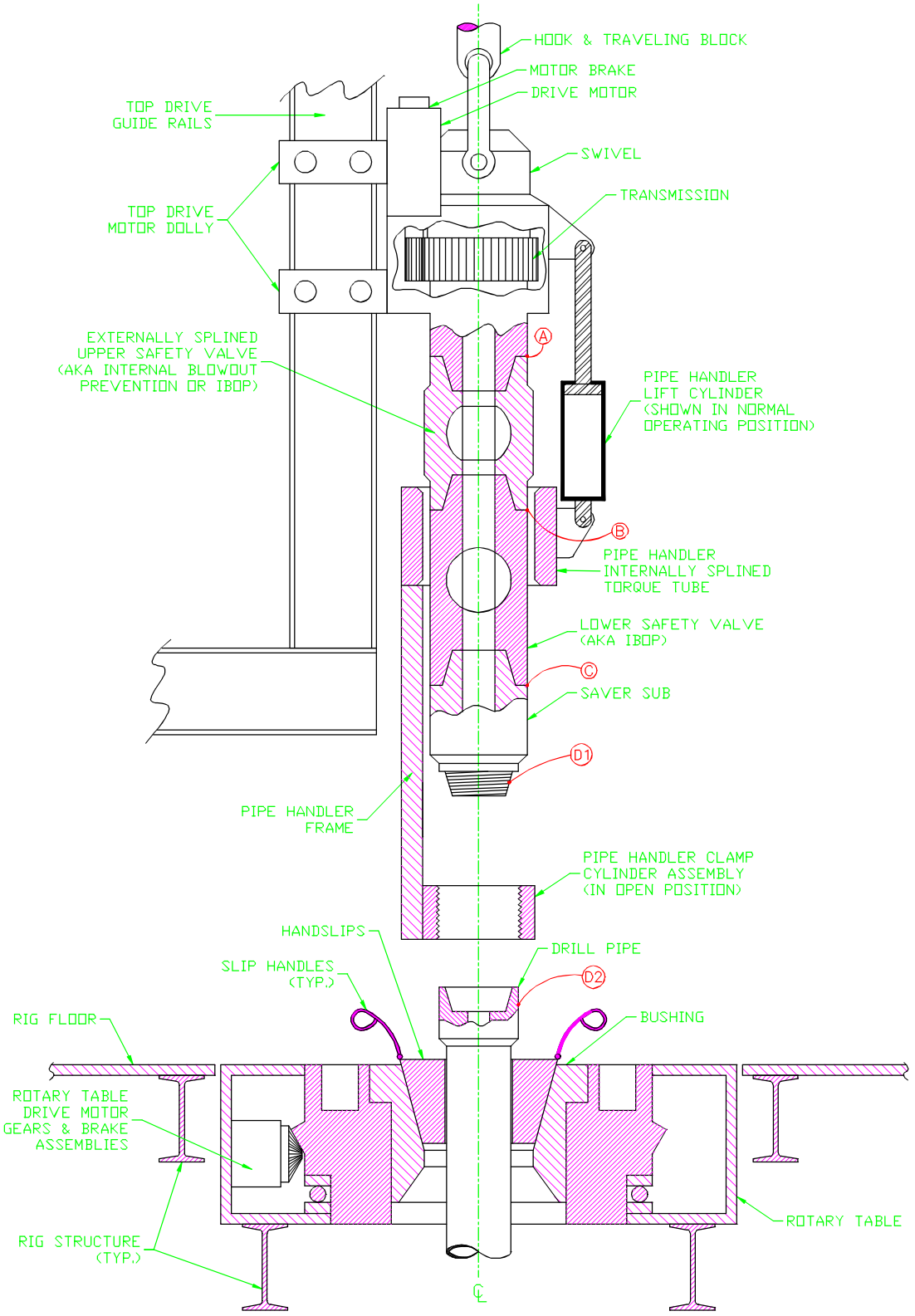
| L - LIKELIHOOD | | |
|---|---|---|
| CATEGORY | | DEFINITION |
| LOW | (1) | Remote |
| MED | (2) | Possible |
| HIGH | (3) | Probable |

| S - SEVERITY | | | | |
|---|---|---|---|---|
| CATEGORY | | DEFINITIONS | | |
| LOW | (1) | No Injury | No Damage | No Pollution |
| MED | (2) | First Aid Injury | Minor Damage | Minor Pollution |
| HIGH | (3) | Lost Time Injury | Major Damage | Major Pollution |

| SEVERITY | R - RATING | | | |
|---|---|---|---|---|
| H | 3 | 6 | 9 | |
| M | 2 | 4 | 6 | |
| L | 1 | 2 | 3 | |
| | L | M | H | |
| | | LIKELIHOOD | | |

| RESULT | |
|---|---|
| | Unacceptable |
| | Tolerable |
| | Acceptable |
| JRA Policy Reference | |
| HSE 100.20 | |

IS THERE A SAFER WAY TO COMPLETE THE JOB? ARE THERE ALTERNATIVES WITH LESS RISK?




# TOP DRIVE, PIPE HANDLER AND ROTARY TABLE GENERAL ARRANGEMENT

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4225 HWY. 90 EAST
BROUSSARD, LA 70518
(318) 837-8847

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| | | 04/28/04 |

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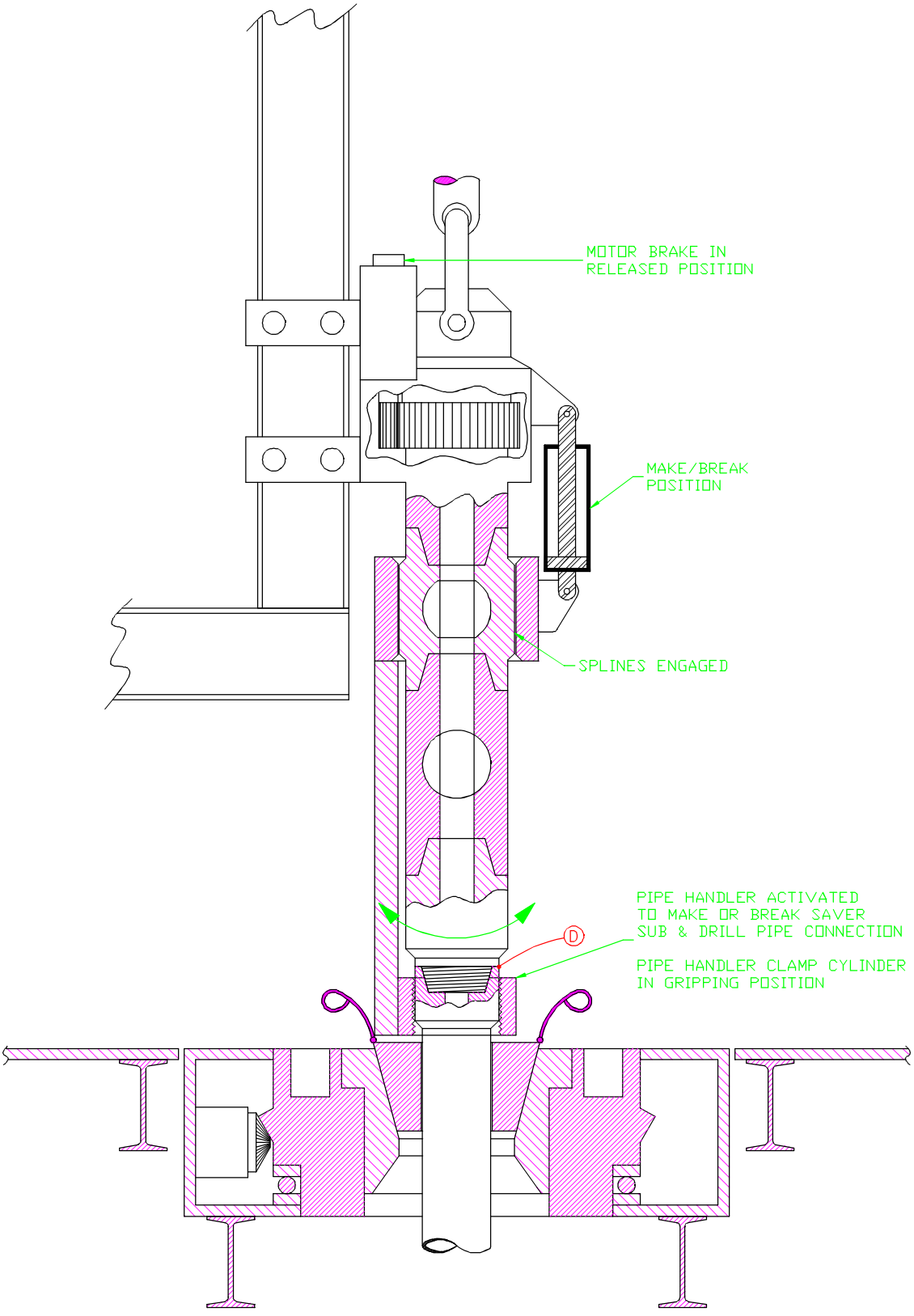


# PIPE HANDLER IN MAKE - UP AND BREAK - OUT POSITION

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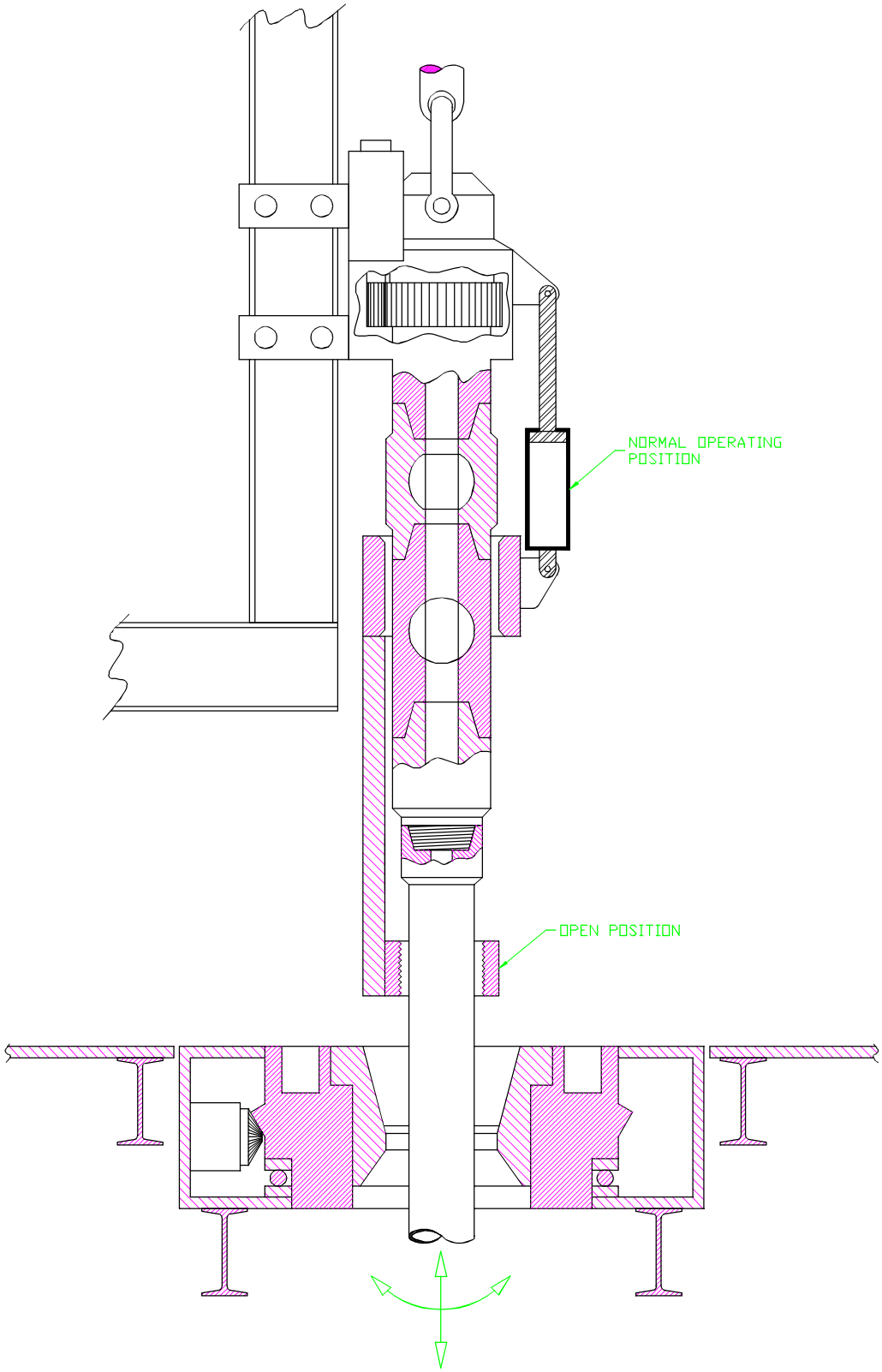


# TOP DRIVE CONNECTED TO DRILL PIPE IN NORMAL OPERATING MODE FOR ROTATING AND TRIPPING

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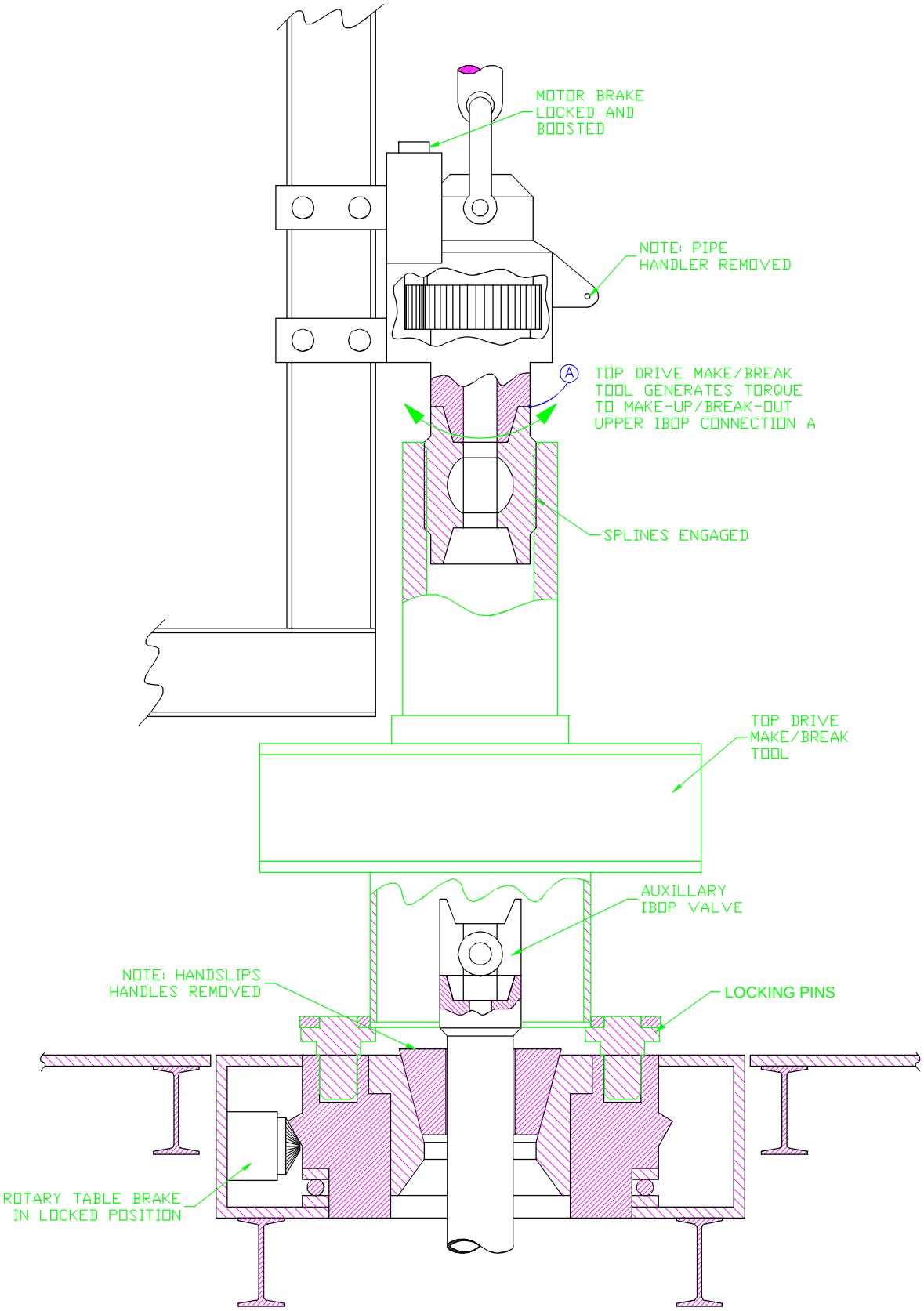


# TOP DRIVE MAKE / BREAK TOOL IN MAKE / BREAK POSITION

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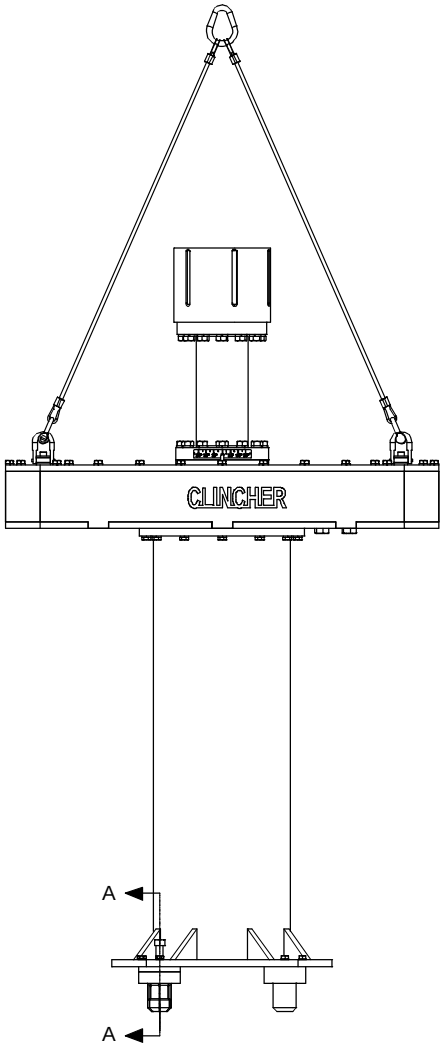


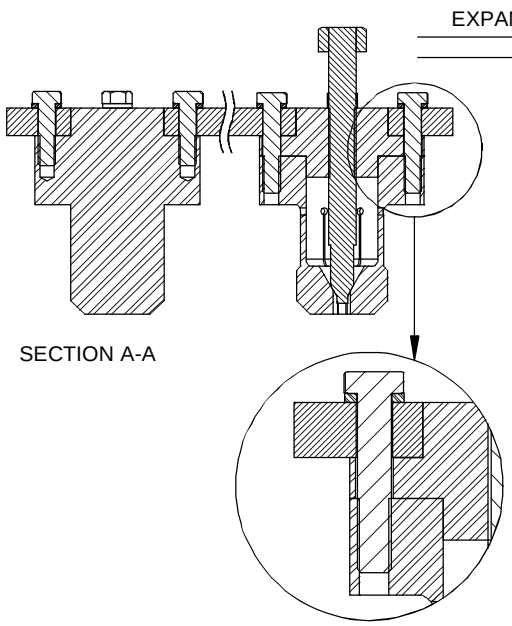


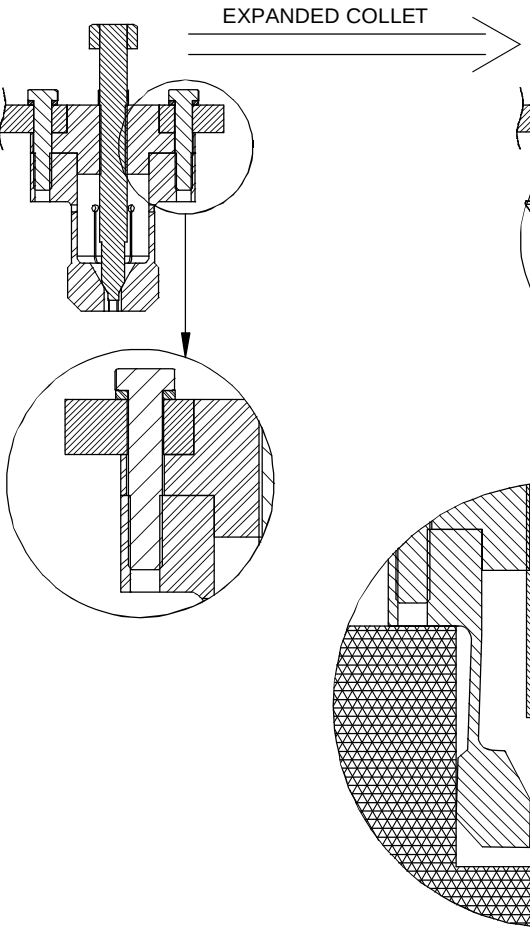


# DRIVE PIN ILLUSTRATION

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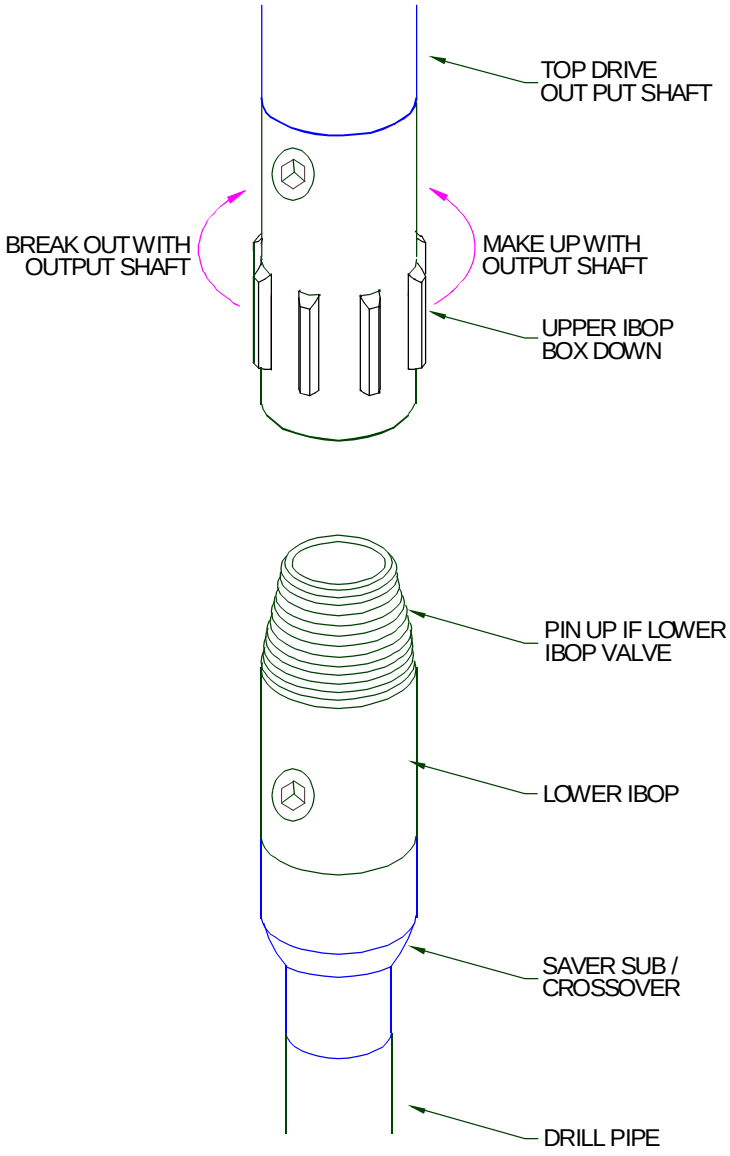


# IBOP ILLUSTRATION

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|---|---|---|
| REV. # | LOG # | DATE |

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# MAINTENANCE INSTRUCTIONS

Superior recommends that owners of Make/Break Tools and accessories adapt a regularly scheduled maintenance program. Implementation of this type of program offers several benefits. First you increase the life of your equipment, secondly, you may find a problem before it escalates to a costly repair or down time on the job, and most importantly, prevent injury to operating personnel.

A major inspection should be carried out if equipment is suspected to have been damaged during transit or is to be mobilized to a remote location where maintenance operations are difficult to carry out.

**Routine Maintenance**

Cleaning:

A) Pre-wash unit to remove majority of dirt and grease build up as to allow inspection of overall condition of unit.

B) Clean and inspect for damage or excessive wear (cracks, breakage, and uneven wear patterns).

C) Inspect all hoses for wear, replace as necessary.

D) Lubricate zerts on reels and bearings.

E) While maintaining pressure visually inspect hoses, stainless steel lines, fittings, etc., for seepage of hydraulic fluid. Repair or replace parts causing leaks. If you see no visible external leaks and you are still losing pressure, there may be an internal leak in the load holding valve. It is recommended that the unit be returned to the manufacturer for repair.

F) Test. Re-inspect hydraulic system for leaks.

# TROUBLE SHOOTING

| Problem | | Solution |
|---|---|---|
| A) | Unit does not function. | Insure all hoses are properly connected and isolation valve is open.. |
| B) | If fluid is heard flowing through console within the directional control valve in the neutral position. | Adjust inlet section pressure relief valve setting to pressure greater than hydraulic power unit supply pressure. |
| C) | Unit does not generate maximum break out torque or reach 2000 psi. | Check hydraulic power unit supply pressure. If greater than 2000 psi, verify break out pressure relief valve's setting (inside console) is greater than 2000 psi. |
| D) | Unit does not generate maximum make up torque or reach 2000 psi. | Check panel mounted adjustable relief valve to insure it is not backed off. Verify make up pressure relief valve's setting (inside console) is greater than 2000 psi. |

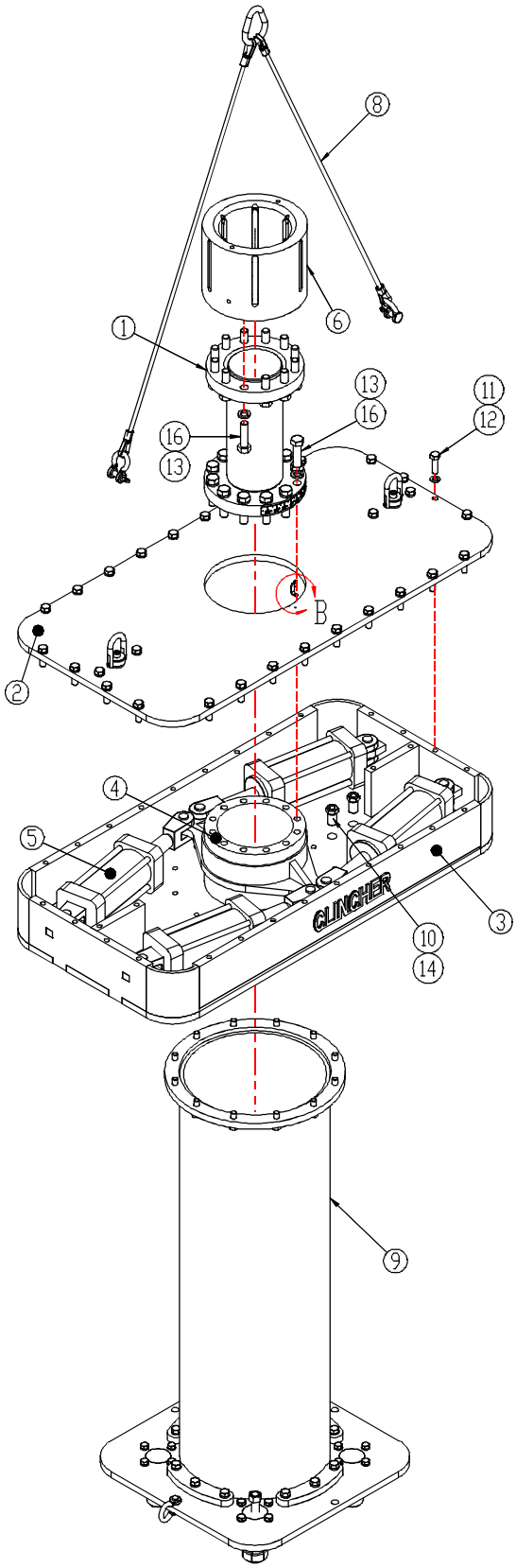
# SECTION 7 PARTS LISTS

## RECOMMENDED SPARE PARTS LIST

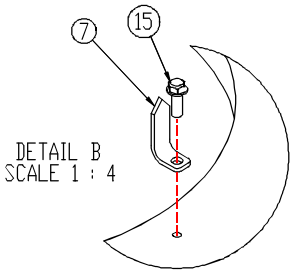
| ***Part Number*** | ***Quantity*** | ***Description*** |
|---|---|---|
| Superior PN 1001 | 8 | 1/8 NPT Zerts |
| 6533N-T2NV | 2 | Cylinder Rod Seal Kit |
| 6633N-T2NU | 2 | Cylinder Piston Seal Kit |
| A20-STDBK | 2 | Valve Seal Kit |
| S26-58475-0 | 2 | Dump Valve Seal Kit |
| Superior PN CRSS20009 | 1 | Remote Operated Relief Valve |
| Superior PN TDMB1010 | 2 | 2" Pin |
| TDMB1025 | 1 | Sling Assembly |

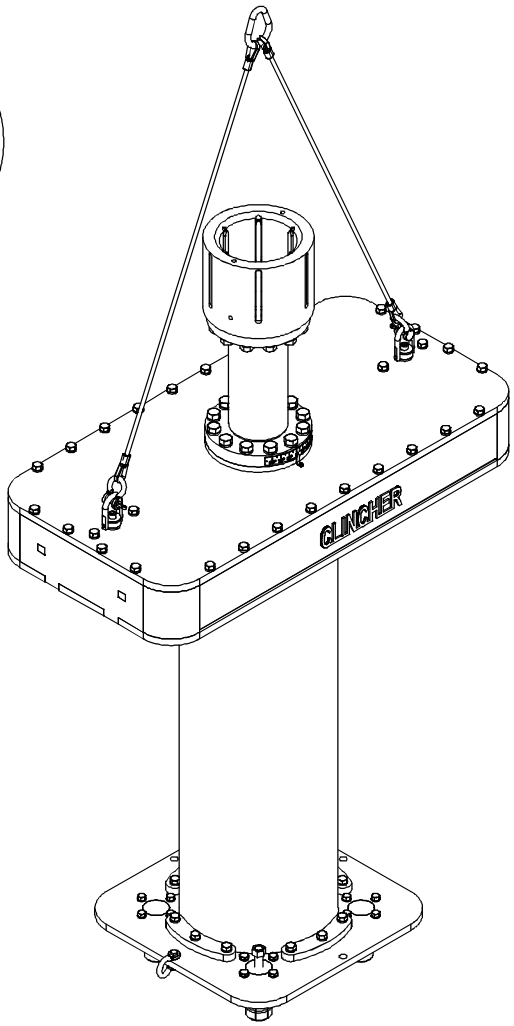
# SECTION 8 MAKE/BREAK TOOL ILLUSTRATIONS

TOP DRIVE MAKE/BREAK TOOL ASSEMBLY *(TDMB2000)* ..... 8 - 3
FLEXIBLE INSERT ASSEMBLY *(Assy. No. TDMB2013)* ..... 8 - 4
LOWER EXTENSION ASSEMBLY *(Assy. No. TDMB2040)* ..... 8 - 4.1
SLING ASSEMBLY *(Assy. No. TDMB1025)* ..... 8 - 5
AIR BOOSTER PANEL *(Assy. No. TDMB1036)* ..... 8 - 6




| Item # | Qty. | Part Number | Part Description |
|---|---|---|---|
| 1 | 1 | TDMB2001 | UPPER EXTENSION WELDMENT |
| 2 | 1 | TDMB2003 | TOP PLATE ASSEMBLY |
| 3 | 1 | TDMB2004 | BOTTOM PLATE/MID BODY WELDMENT |
| 4 | 1 | TDMB2006 | HUB WELDMENT |
| 5 | 4 | TDMB2007 | CYLINDER 5" BORE, 10" STROKE, 2" ROD |
| 6 | 1 | TDMB2017 | DRIVE SUB (PH85) |
| | OR | TDMB2018 | DRIVE SUB (PH60) |
| 7 | 1 | TDMB2027 | POINTER |
| 8 | 1 | TDMB1025 | SLING |
| 9 | 1 | TDMB2040 | LOWER EXTENSION ASSEMBLY |
| 10 | 2 | BUCST7623 | BULKHEAD CONNECTOR |
| 11 | 30 | 1171 | 3/4" LOCKWASHER |
| 12 | 30 | 1183 | 3/4"-10 X 2 1/2" HHCS |
| 13 | 24 | 1218 | 1" LOCKWASHER |
| 14 | 2 | 1219 | 1 1/4"-12 JAM NUT |
| 15 | 1 | 1337 | 1/4"-14 X 3/4" HHCS SELF DRILLING/TAPPING |
| 16 | 24 | 74053 | 1"-8 X 3 3/4" HHCS |




# TOP DRIVE MAKE/BREAK TOOL ASSEMBLY

ASSEMBLY NO. TDMB2000



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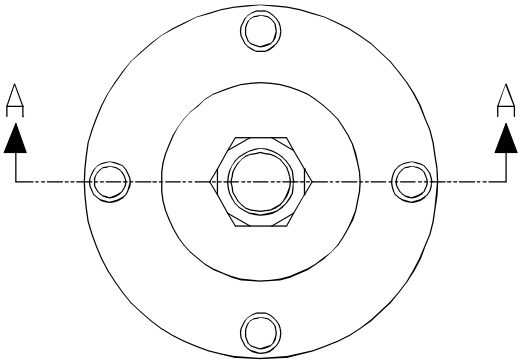
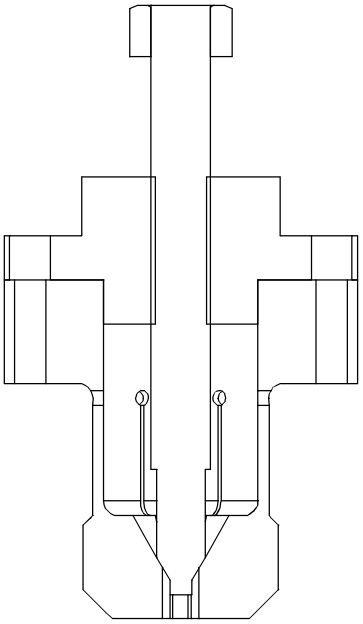
| | | 02/23/05 |
|---|---|---|
| REV. # | LOG # | DATE |

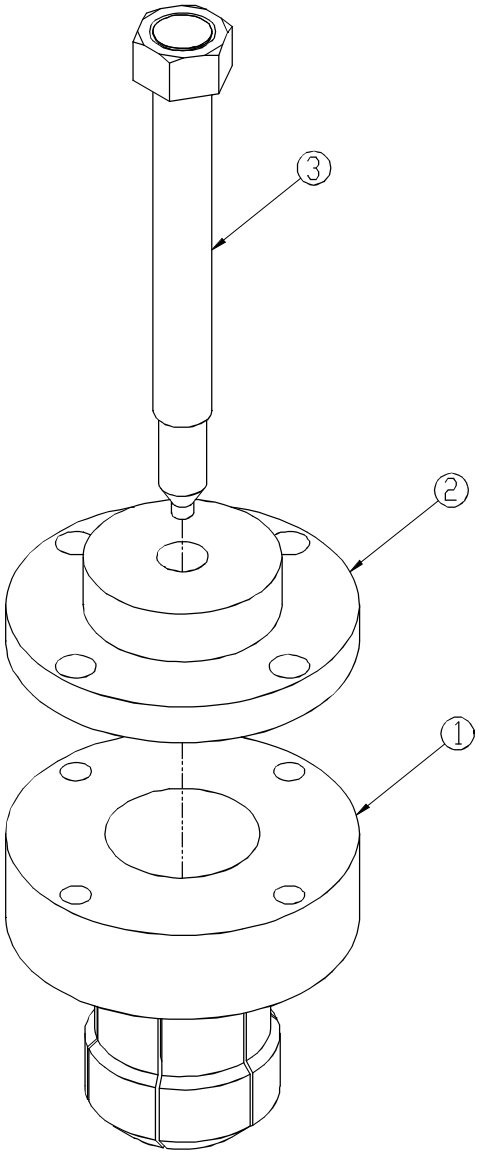
REF: S:\Equip Manuals\Dwgs\TDMB2000\Assembly 2nd Gen.wpg

| Item # | Qty. | Part Number | Part Name |
|---|---|---|---|
| 1 | 1 | TDMB2010 | FLEXIBLE INSERT |
| 2 | 1 | TDMB2011 | FLEXIBLE INSERT CAP |
| 3 | 1 | TDMB2014 | ALL-THREAD WELDMENT |



SECTION A-A




# FLEXIBLE INSERT ASSEMBLY

ASSEMBLY NO. TDMB2013

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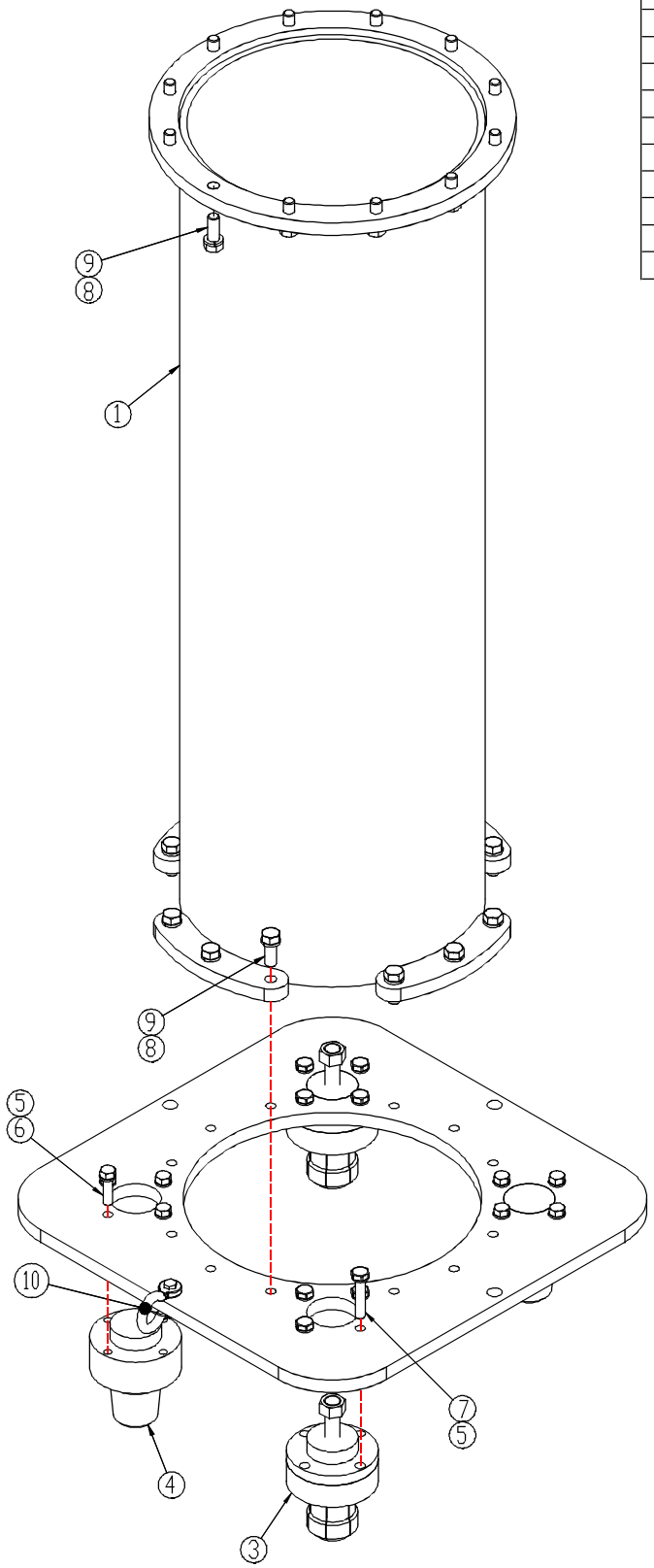


| Item # | Qty. | Part Number | Part Description |
|---|---|---|---|
| 1 | 1 | TDMB2019 | LOWER EXTENSION WELDMENT |
| 2 | 1 | TDMB2019-S3 | BOTTOM PLATE |
| 3 | 2 | TDMB2013 | FLEXIBLE INSERT ASSEMBLY |
| 4 | 2 | TDMB2012 | SOLID INSERT |
| 5 | 16 | 1151 | 5/8" LOCKWASHER |
| 6 | 8 | 201 | 5/8"-11 X 2 1/4" HHCS |
| 7 | 8 | 204-A | 5/8"-11 X 3 1/4" SHCS |
| 8 | 24 | 1171 | 3/4" LOCKWASHER |
| 9 | 24 | 1190 | 3/4"-10 X 2" HHCS |
| 10 | 1 | TDMB1025-S2 | 5/8" X 3 1/4 TON BOLT TYPE SHACKLE |

# LOWER EXTENSION ASSEMBLY

ASSEMBLY NO. TDMB2040

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| | | 02/23/05 |
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| REV. # | LOG # | DATE |

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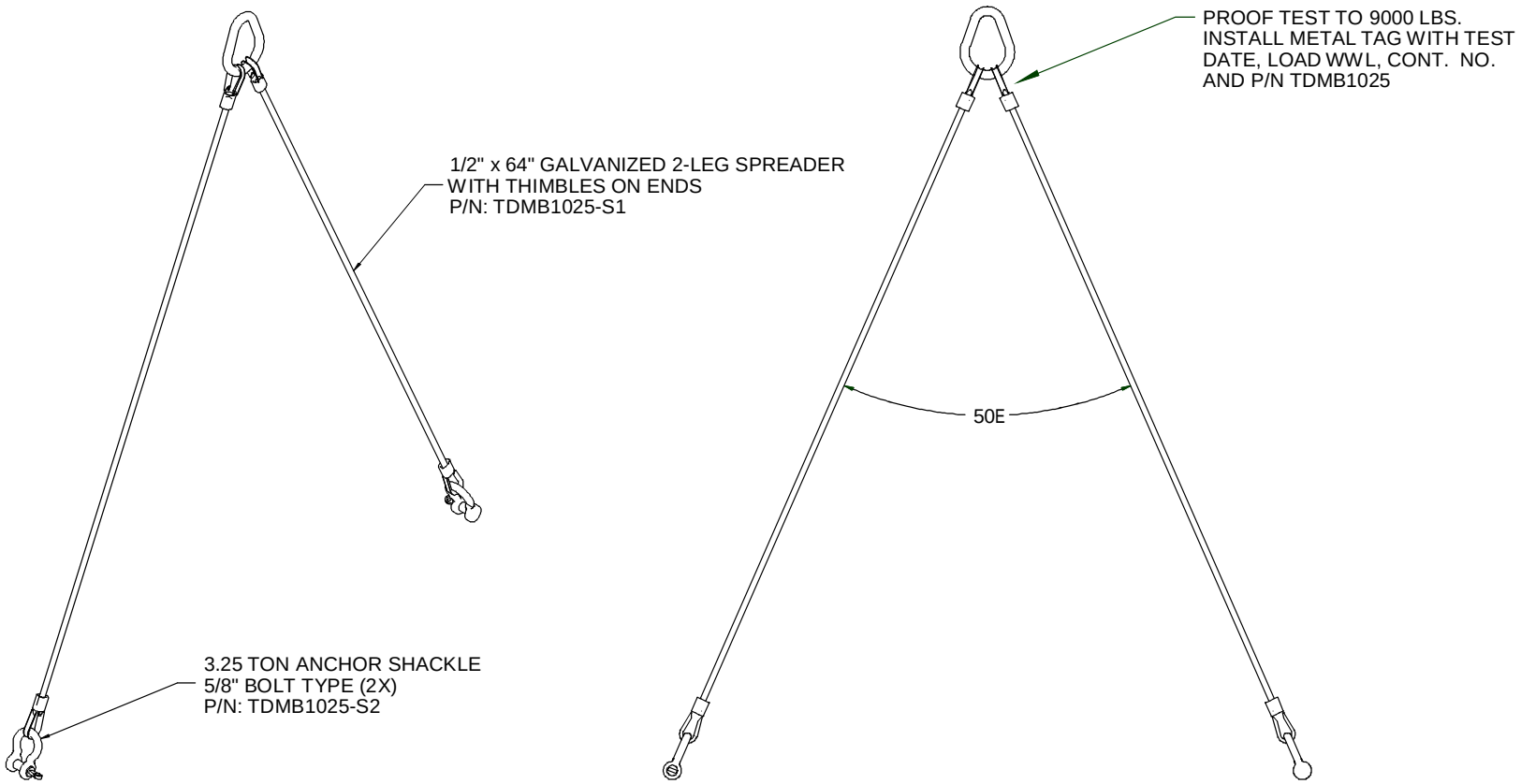


WORKING LOAD LIMIT:
SLING 4.5 TONS AT 65E (50E INCLUDED ANGLE)

APPROXIMATE WEIGHT (LBS.) = 11.045865

# SLING ASSEMBLY

ASSEMBLY NO. TDMB1025

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| 1 | | 09/17/04 |
|---|---|---|
| REV. # | LOG # | DATE |

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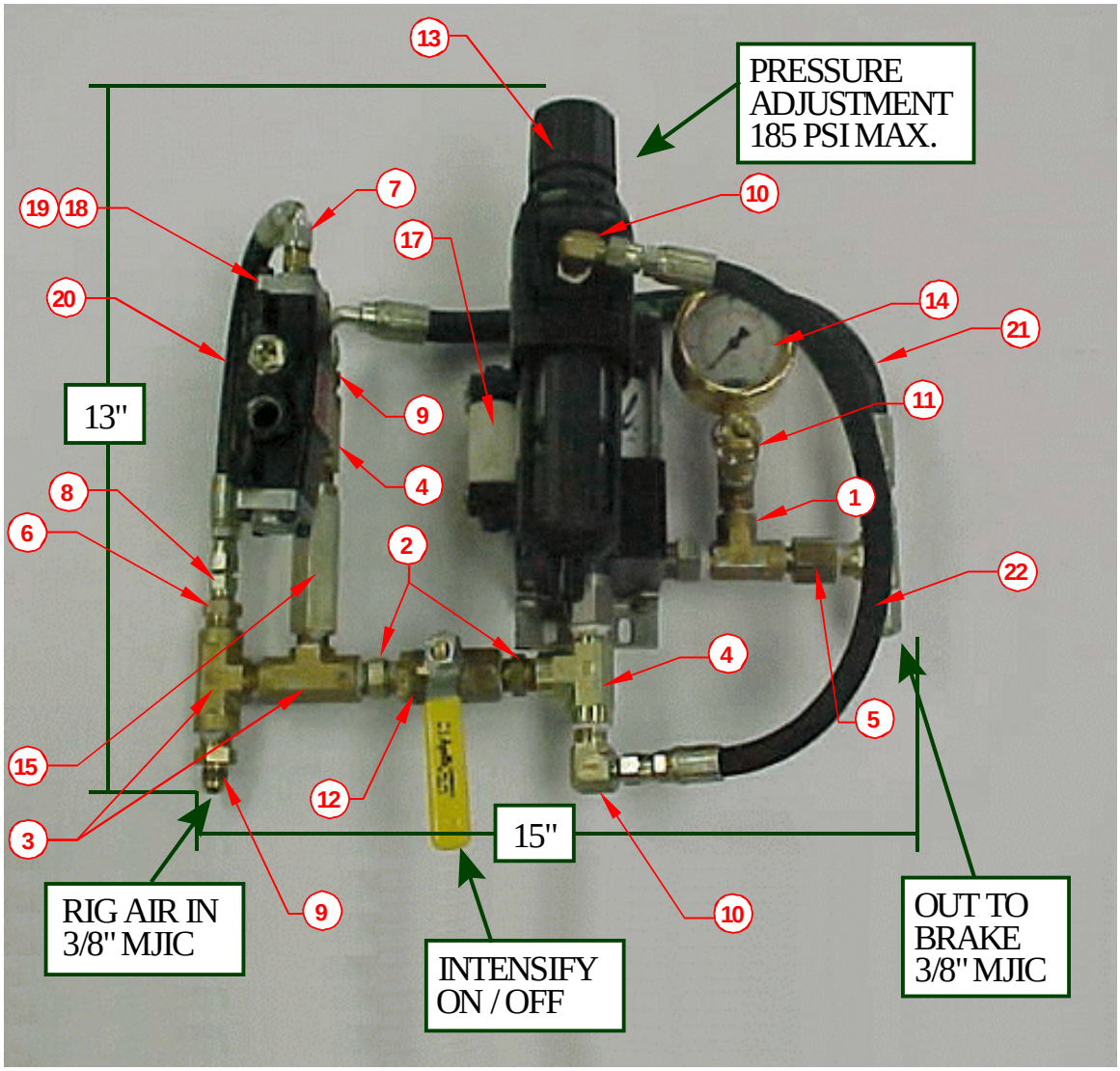


| Item # | Qty. | Part Number | Part Description |
|---|---|---|---|
| 1 | 2 | 1/4 MRO | 1/4" MALE RUN TEE |
| 2 | 3 | 3/8 FF | 3/8" MALE PIPE NIPPLE |
| 3 | 2 | 3/8 MMS | MALE BRANCH TEE 3/8" MNPT X 3/8" FNPT |
| 4 | 2 | 3/8 MRO | 3/8" MALE RUN TEE |
| 5 | 1 | 3/8 X 1/4 FG | 3/8" NPT X 1/4" NPT EXPANDER/ADAPTER |
| 6 | 1 | 3/8 X 1/4 PTR | 3/8" NPT X 1/4" NPT PIPE THREAD REDUCER |
| 7 | 1 | 4 FTX | MALE CONNECTOR 1/4" MJIC X 1/8" MNPT |
| 8 | 1 | 4-4 FTX | 1/4" MNPT X 1/4" MJIC STRAIGHT |
| 9 | 2 | 6-6 FTX | 3/8" MNPT X 3/8" MJIC STRAIGHT |
| 10 | 1 | 6-6 CTX | MALE ELBOW 3/8" MJIC X 3/8" MNPT |
| 11 | 1 | 9889K19 | AIR POP OFF VALVE 185 PSI, 1/4" NPT |
| 12 | 1 | 1478 | BALL VALVE BRASS, 3/8" FNPT |
| 13 | 1 | B18-02-FK00 | AIR FILTER/REGULATOR 1/4" NPT PORTS |
| 14 | 1 | BAC-600-25 | GAUGE 600# 2-1/2" DIA. BRASS |
| 15 | 1 | CM4554 | 3/8" CHECK VALVE |
| 16 | - - | - - - - - | - - - - - |
| 17 | 1 | HAA31-2.5 | GAS BOOSTER, 2.5:1 RATIO |
| 18 | 1 | TDMB2039 | AIR BOOSTER MOUNTING PLATE WELDM. |
| 19 | 1 | TDMB1036-S2 | 2 POSITION / 4 WAY PILOTED AIR VALVE |
| 20 | 1 | H4-11-FJFJ9 | 1/4" HOSE X 11" LONG FJIC X FJIC 90E |
| 21 | 1 | H6-16-FJFJ9 | 3/8" HOSE X 16" LONG FJIC X FJIC 90E |
| 22 | 1 | H6-18-FJFJ | 3/8" HOSE X 18" LONG 3/8" FJIC BOTH ENDS |

NOT SHOWN IN THIS ILLUSTRATION:

| Item # | Qty. | Part Number | Part Description |
|---|---|---|---|
| | 4 | 1008-B3 | 1/4"-20 X 1/2" HHCS |
| | 4 | 101 | 1/4" LOCKWASHER |
| | 1 | 1456 | 1/4" HEX NIPPLE |
| | 3 | 1579-C | 3/8" NPT VENT |
| | 1 | 1599-A | 3/8" MNPT X MJIC BRANCH TEE |
| | 2 | 1606 | 1/4" FLUSH PLUG |
| | 1 | 1609 | 3/8" NPT FLUSH PLUG |
| | 1 | 6 CTX | 3/8" MJIC X 1/4" MNPT 90E ELBOW |

OPTIONAL:

| Item # | Qty. | Part Number | Part Description |
|---|---|---|---|
| | 1 | TDMB2028 | SOLENOID VALVE EXPLOSION PROOF |
| | 3 | 1491 | 1/2" MNPT X 3/8" FNPT REDUCER BUSHING |
| | 1 | 1402 | 3/8" X 3" PIPE NIPPLE |

# AIR BOOSTER PANEL

## ASSEMBLY NO. TDMB1036

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| 1 | | 02/23/05 |

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# SECTION 9 VALVE TECHNICAL DATA

**To request copy of Valve Technical Data, please contact:**

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**Broussard, LA 70518**
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**Fax: 337-837-8839**
**www.superior-manf.com**